COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper- Second-class postage paid at Boston, Mass.

Vol. III No. 11 | March 26, 1969 | Price: $9/ year

The H-316 comes in two versions – a table-top version, shown above right, and a pedestal version.

Honeywell Offers a Mini, Expanding User's Choice

FRAMINGHAM, Mass. – The choice of mini computers available to users expanded last week when Honeywell's Computer Control Division announced its first mini – a 4K, 16-bit machine selling for $9700. The first deliveries are scheduled for June.

The new H-316 is a logical member of Honeywell's 16-bit family, following the larger DDP-116, 416, and 516. Honeywell expects its major applications to be in remote terminal and display control, communications concentration, scientific data acquisition, and process control. It is expected to sell in the end-user, OEM, and systems-building markets.

The new computer's basic memory size is 4096 16-bit words expandable to 16,384 words. It is fully program and data compatible with the DDP-516, with the same complement of registers (A, B, C-bit, P, M, X, and Y), the same 72-instruction repertoire, and compatible input/output interface characteristics. The 516's proven software is available for the 316.

(Continued on Page 4)

For More About Minis See Second Section

1st Installations Made Of Dial-Up Interfaces

MINNEAPOLIS, Minn. – One of the first installations of the new $2-a-month telephone data access interfaces has been made here by Northwestern Bell. It is being used by Computer Terminals, Inc. to test various modems and terminals.

The new arrangement, which allows "foreign" attachments formerly limited to leased lines to be connected directly to the ordinary dial-up network, is a major result of the Carterfone case decided last year. Prior to the Carterfone decision, the telephone companies would not allow non-Bell equipment to be connected to the dial-up network. This restriction was ruled unlawful by the Federal Communications Commission.

Northwestern Bell is believed to be one of the first telephone companies to implement the new data access arrangement.

A number of other telephone companies are in the process of having the necessary tariffs approved in their states. State approval is required as well as the FCC approval already granted.

Two-Button Box

The new system involves placing a box with two buttons on it alongside an ordinary telephone line. The dialing must be done through a Bell System telephone. (Whether this is necessary is still being disputed.) The box contains zenar diodes, etc. to prevent any improper input to the network.

One-Minute Job

Use of the system involves connecting two wires to the two buttons – which takes less than one minute. Computer Terminals found that it could get modems from outside suppliers to connect between the data access device and its own terminals, which it wishes to test, in a couple of days.

Computer Terminal. is current-

(Continued on Page 4)

Computer Terminals President Roy Merwin and Systems Vice President Don Berteau watch the installation of the $2 a month interface.

ACM Asking DPMA for Financial Aid?

NEW YORK – The Association for Computing Machinery has put out unofficial feelers to the Data Processing Management Association to see if the DPMA might help the ACM out of its present financial crisis, it was reported last week.

No official confirmation of the reported action could be obtained.

The action followed the recent dissolution by ACM President Bernard C. Galler of the committee on ACM and DPMA relations after no tangible result had been obtained in a number of years of on again, off again negotiations between the two bodies.

DPMA Financially Healthy

The DPMA is believed to have a net worth of nearly a million dollars at the international level, whereas the ACM, at the end of 1968, appeared to have a net debt in excess of $300,000. The DPMA chapters are considerably more independent in their operations than their equivalents in ACM and have substantial assets. The Chicago chapter, for instance, has an annual budget in excess of $60,000.

Relations between the two bodies have been strained by the fact that their members are very different and often have little time for the interests of the other. ACM members have traditionally considered DPMA members to be tab shop operators, while DPMA members have regarded ACM members as impractical academicians.

Only 5% Overlap

A recent survey by the American Federation of Information Processing Societies indicated that only 5% of ACM's members are also members of DPMA.

An article on ACM and its financial problems appears on page 23.

Registration System Called Inadequate

By a CW Staff Writer

WASHINGTON, D.C. – Neither copyrights nor the recently proposed registration system would properly protect software inventions, the Association of Independent Software Companies declared last week.

The association, which supports patenting as the best way to protect software, said in a letter to U.S. Patent Commissioner Edward Brenner that "programming is just a new media for constructing devices that perform functions automatically.

long as the claimed inven- s new, useful, and non- us, it should be patentable, particularly when directed to an industrial technology." Richard Jones, association president wrote.

"We do not feel that it is fair or reasonable for the patent system to discriminate against the computer program embodiment of a true invention, particularly when the computer program is more economical," Jones wrote.

The letter suggested that the Patent Office could better spend the taxpayers' money in preparing to process software patent applications than in "exploring what we consider inadequate means for protection and expending your resources in litigation to exclude this important area of technology from patent protection."

The mention of litigation was apparently a reference to the Prater and Wei case in which the Patent Office is opposing the court-directed granting of a software patent. The Patent Office is on record in opposition to software patents.

Under the registration system, as proposed by IBM, actual programs would be protected but the concepts behind them would not.

Opponents of copyrighting contend a copyright would not prevent unauthorized use of proprietary software.

On the Inside

Mini Computers: Why Be Interested? – *Second Section*

ACM Crisis: What Happened to Safeguards? – *Page 23*

Acquisitions 21
Earnings 19
Editorials 8
Education 10
Financial 19
New Products 6
Research Report 9
Software 14

Moorhead Urges Computer Coordination For Congress

NEW YORK – William S. Moorhead told a group of data processing experts last week that Congress has some way to go before it leaves the "quill and snuffbox" era and joins the computer age.

But, the Pennsylvania Democrat added, Congress must now consider "coordination" of present computer activities as well as development of new ones.

Moorhead gave the luncheon address at the American Management Association's 15th Annual Electronic Data Processing Conference.

Moorhead said that as recently as 1966, there were no computer activities in Congress except for "one small unit in the Library of Congress" which was used for payroll purposes.

Although a few more data processing systems are at work on the hill today, this congressional situation, when contrasted with the increased employment of data systems by the executive branch, has "jeopardized the balance which Congress must maintain between it and the executive," he said.

The growing role of the congressman today, Moorhead said, is complicated by the fact that at present the problem facing Congress is "not that of too little information, but too much."

Finding the Significant

Moorhead said, "We must be able to distinguish between the significant fact and the inconsequential detail, and we in Congress must have equal access to data which will allow us to function rapidly and effectively."

This imbalance between the executive and Congress would be corrected by increased installation of computerized systems by the legislative branch.

"For several years I have been attempting to instill in members of Congress a desire to seek new tools and techniques which can allow Congress to serve the people of this country in a more responsive way."

Despite his efforts, and those of a handful of other congressmen, there are rooms on the Capitol which still handle papers "in about the same way they were when George Washington was President," he said.

He noted a strong inclination among most organizations planning computer systems to "jump on quickly without carefully considering long-term needs."

Planning Needed

"As Congress moves into the computer age," Moorhead said, "it is my feeling that the biggest mistake we can make is to acquire one machine for mailing services and then find that another is required for research, another for file maintenance, another for publication of the calendar, another for the digest, etc."

Capitol Hill computers must be compatible; they must be able "to talk to one another," he said.

Moorhead, a member of the Joint Economic, Banking, and Currency, and the Government Operations Committees, hopes this needed coordination will come from his latest computer bill (H.R. 7012).

The bill features the creation of an independent, "dedicated" computer center, manned by a professional staff. The purpose of the center, as set forth in the bill is to assist the two Houses of Congress, their officers, committees, joint committees, members, and supporting services in the performance of their respective functions by making available to them automatic data processing services.

NEED COMPUTER TIME? 360/30

Two 360/30 Systems
One 65K Disc/Tape
1285 Optical & 2671 Paper Tape Readers Available

Convenient to firms in NY – WEST – NJ – CONN

Call (212) 792-4354
K. KURZ or R. MAHONEY

COMPUTRONIC SYSTEMS, INC.
815 Hutchinson River Parkway, Bronx, N.Y. 10465

Subscribe To Computerworld See Pg. 14

Is your company going into the computer business against your will?

If you want to solve your information processing problem, you could spend $430,000. Or more. Hire all sorts of DP Managers, Systems Analysts, Programmers, Keypunch Operators. Buy computers. Or rent them. Go back to school and learn all about computers. Flash big words around like "capabilities, batch processing, multi-sequential, optional source diagnostics, implementation of compiler processes". Worry about whether you're getting top price/performance ratio. Or call SSI . . .

ONE-SOURCE DP SERVICE

Systems Design & Audit/ Feasibility Studies/ Programming/ Program Packages/ Software Development & Consultation Data Retrieval Services/ Design, Engineering & Production/ File Conversions/ Data Preparation/ Computer Time Packaged Programs/ Resident Training/ Management Seminars/ Student Training Programs/ Personnel Selection Manpower Planning/ Salary Plans/ Personnel Policies/ Computer Leasing/ Peripheral Equipment/ Accounting Machines Delivery, Storage & Transfer of Electronic Equipment/ Construction/ Air-Conditioning/ Electrical Wiring/ Computer Room Design

SSI STRATEGIC SYSTEMS INC.
Corporate Offices: 605 Third Avenue—New York, N.Y. 10016
Mr. M. D. BRODY, 212/687-2100
FACILITIES IN NEW YORK and WASHINGTON, D.C.

DATA COMMUNICATION IDEAS?

TALK TO *TALLY*

Need only one way data communications? Tally receive terminals offer cost savings along with big benefits. The Tally System 228 receives data at 600 or 720 words per minute from all low cost Tally parallel transmitters. Unattended answering and automatic error control are standard.

Write or call Tally, 1310 Mercer St., Seattle, Wash. 98109. Phone: 206-624-0760.

A generation which talks your language

With fourth generation computers, the user is free at last from traditional hardware, language limitations. He can adapt the logic design of his machine to optimize the system for differing types of problems. The secret is microprogramming. It is the basic reason for the tremendous improvement in cost-performance ratio over a broad area of computer applications. Machine language independence and problem adaptability make fourth generation computers extremely versatile and remarkably economical. These computers embody all the technical advancements of third generation machines and then some.

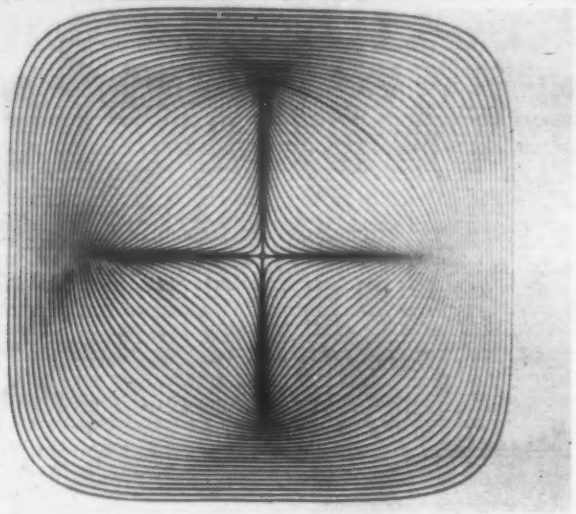
We were the first company to ship a fourth generation computer and so far we have shipped more of them than anyone else.

If you want versatility with low cost, we're talking your language.

IC-4000—a fourth generation computer. 32K word (36 bits). COBOL and Sort/Merge. Compiles up to 4000 FORTRAN statements per minute. Other models for computer science study, simulation, 1401 emulation. Leasing starts at $4131 per month. Call William W. Otterson, Manager of Marketing, collect at (213) 387-5267 or write for full documentation.

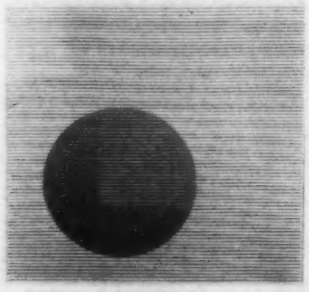
Standard Computer

STANDARD COMPUTER CORPORATION 1411 West Olympic Boulevard, Los Angeles, California 90015 (213) 387-5267

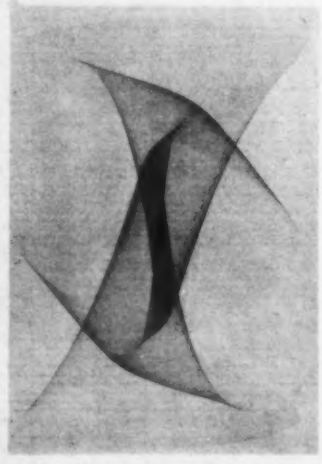


Plotter Art Winners

This computer drawing entitled "Cross" by Gordon Hines, 25, won the $500 first prize in CalComp's 1968 computer-plotter art competition. A $5000 scholarship in Hines' name was donated to Queen's University, Kingston, Ontario, where Hines is a doctoral student.



Called "Tancentric," this drawing won the $300 second prize for Linda Sue Lowery, a graduate student at George Washington University. CalComp also presented a $3000 scholarship in her name to the university.



"Oscillating Wasterbasket" is the name of this plotter drawing which won the $200 third prize for George Olshevsky, Jr., a post-graduate student at the University of Toronto, Ontario. A $2000 scholarship in his name was given to the university.

Service Bureau Installs a 6500

WINNIPEG, Manitoba – Symbionics Systems Ltd. of Canada has announced that it will expand its service capability by installing a Control Data 6500 multiprocessor system in May, according to B.A. Hodson, company president.

The company will offer remote batch processing for customers with terminals and a courier service for others. Rates will be adjusted by shift, volume, and length of contract, Hodson said.

The firm also offers systems and programming advice and management consulting.

The new computer will serve both Winnipeg and the western Canada region.

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

TM Reg. U.S. Pat. Off.

Weekly Newspaper – Second Class Postage Paid at Boston, Mass. Published every Wednesday by COMPUTERWORLD, Inc., 60 Austin St., Newton, Mass. 02160. Telephone: (617) 332-5606 & TWX: 710-335-6635. Copyright 1969 by COMPUTERWORLD, Inc.

Alan Taylor, *Editor*. Robert M. Patterson, *News Editor*. Evelyn Cowell, *Special Supplement Editor*. Neal Wilder, *National Sales Manager*. Margaret Phelan, *Circulation Manager*. Henry Fling, *Art Services Supervisor*. Kate Rachstein, *Typesetting Services Supervisor*.

Patrick J. McGovern, *Publisher*. W. Walter Boyd, *Associate Publisher*.

Subscription rates are: $9 for one year, $16 for two years. Add $1 per year for Canada; $3.50 per year for Foreign. Please send all editorial and subscription material to: COMPUTERWORLD, 60 Austin St., Newton, Mass. 02160. (617) 332-5606.

Reproduction of material appearing in COMPUTERWORLD is strictly forbidden without written permission. Send all requests for permission to the Editor.

Defense Department Replies to Brooks On Worldwide Procurement Criticisms

WASHINGTON, D.C. – The Department of Defense has partially answered the lengthy criticism leveled by Rep. Jack Brooks, D-Texas, against the projected World Wide Military Command and Control System (WWMCCS).

In a letter to Brooks, chairman of the Government Activities Subcommittee, DOD offered to present the department's analyses to him when they have been completed. The department also offered a contact, which Brooks had wanted, to serve as liason with Brooks. The contact is Dr. Gardiner L. Tucker, deputy director of defense, research and engineering, electronics and information systems.

DOD's analysis is based on a number of excellent studies conducted by the Air Force, Joint Chiefs of Staff, and defense agencies, according to John S. Foster, Jr., deputy director of defense for research and engineering. However, Foster agreed with Brooks that "the specifications for a standard data management system are indeed in a very preliminary state."

Brooks' letter of Feb. 17 also raised the following points:

1. His subcommittee could find no feasibility study or evaluation of equipment now in use that supported the need for the new procurement.

2. DOD appears to have decided to select and acquire hardware prior to system development.

3. Lack of indication that the procurement proposes a new computer system significantly better in capability or output than the system now in use.

Foster referred to these as "excellent points that we have been [considering] or will consider."

Foster said that Dr. Tucker was prepared to arrange additional briefings for Brooks and his staff pending completion of the analyses.

The WWMCCS is a huge computer project involving an estimated procurement of between $100 million and $500 million worth of equipment and services over a five-year period.

Personal Rapid Transit Prototype Is Announced

PITTSBURGH – Computer-controlled automated personal rapid transit (PRT) may offer a solution to many of the nation's urban transportation problems.

The system involves the use of electrically operated dual-mode vehicles that can travel both on a guideway track and on streets. It combines the best features of mass transit and private transportation. While moving in a "train" on the guideways, the vehicles can be programmed for individual destinations. The vehicles will move safely, and completely automatically, at speeds of up to 60 miles per hour.

A new PRT computer control system was announced here by William L. Alden, president of the Alden Self Transit System Corp., Westboro, Mass., at the Fourth International Conference on Urban Transportation.

The Alden exhibit showed the control system and a videotape of an operational 1/24th-scale model of the PRT system that uses modified slot cars on an electrified track. The track includes a main high-speed rail and a number of switching stations.

The system, engineered and developed by Bedford Associates, of Bedford, Mass., employs a PDP-8/L computer supplied by Digital Equipment Corp.

Alden foresees the first commercial use of his firm's transit systems in U.S. airports, where they could be used for transporting passengers from parking fields to passenger terminals, moving baggage from the terminals to runways for loading, and moving baggage to the terminals from arriving flights.

Honeywell Entry Expands Mini Computer Selection

(Continued from Page 1)

It includes Exec-16, a multilevel real-time executive; Fortran IV; an extensive math library; utility routines; an I/O library; DOP, a disk-oriented system that facilitates assembly, compilation, storage, and execution of programs; and DAP-16, the Series 16 assembler which can handle any combination of source and object computers within the series.

The H-316 has a cycle time of 1.6 microseconds, per 16-bit word, with a 3.2 microsec. add time. Memory contents can be displayed and modified, one word at a time. Memory is divided into 512-bit sectors for addressing. Multilevel indirect addressing is standard, as well as indexed addressing, and four sense switches. Up to 20 individual I/O channels are available. Peripherals include display units, magnetic disks, drums, tapes, punched cards, paper tape, line printers, communications interfaces, teleprinters, and logging typewriters.

The new computer measures 19 in. by 24.5 in. by 14 in., including 16K of core, a real-time clock, high-speed arithmetic unit, Teletype interface, and a device interface. It weighs about 115 pounds.

Honeywell's new computer will compete directly with, among others, Digital Equipment's PDP-8/I, 8/L, and 8/S; Hewlett-Packard's 2114A, 2115A, and 2116B; Varian Associates' 620; and Scientific Controls' 4700.

The H-316 also comes in a pedestal model.

Dial-Up Interfaces Are Installed

(Continued from Page 1)

ly using Sangamo 202Ds to connect to its TK 300 CRT displays. The system has been used successfully with different transmission rates between Minneapolis and Chicago.

Roy L. Merwin, Computer Terminals president, told CW that the new arrangement is saving money and at the same time giving greater flexibility. "We can buy modems at half the cost of renting them from AT&T," he said, "and this way we can get the flexibility that we need."

Operations Vice-President Don Berteau said the importance of the new system was that it made data communications a lot easier by bringing down the price and increasing the flexibility of the terminals that could be connected.

New Analysis Needed

He cited a typical case – a Boston firm which wanted to have access to a number of outlying shops around Massachusetts. If the firm analyzed this situation last year and found it to be too expensive, then the analysis is now out of date. A reanalysis based on data access arrangements might find the price would be low enough so that the system is now practical. Berteau estimated the savings as at least $20 per month for each terminal.

Computer Terminals provides customer-configurated and totally integrated computer terminal systems. It is headquartered in Minneapolis and provides CRT displays, customer-designed keyboards, and telephone communication devices as well as traditional equipment such as card readers and printers.

Hardware System Proposed To Prevent Software Thefts

PRINCETON, N.J. – A hardware system for protecting proprietary software has been proposed to the U.S. patent commissioner by Applied Data Research, Inc.

Under the proposal, each computer's serial number would be stored in a read-only register which could be checked by the software. Unauthorized use of a proprietary program would result in an abnormal end of job.

The idea is a sharp departure from the registration system in which the Patent Office has expressed interest. Such a proposal, which would protect actual programs but not the concepts used to write them, has been made by IBM [CW, Feb. 26].

ADR's "electronic lock and key" proposal would require no government intervention, a fact that seems certain to win it at least some industry support.

Details of Proposal

ADR outlined its proposal as follows:

1. Every computer system would have about four to eight characters of read-only storage to uniquely identify the computer. This would be equivalent to the computer serial number in use today (but stamped on the CPU).

2. A proprietary software program would be able to access the read-only storage (a register) during its execution.

3. The software program, when generated (or copied) for sale or lease to a user, would create a unique code and constants within the program, which would represent a particular serial number, and which would then act as an "electronic key" when the program was executed. If the serial number was as expected, the program would perform correctly; if not, it would terminate (or not perform correctly).

4. A further extension would be to have the software program check a date in the operating system. If a software system was leased for a fixed period of time, the data could be checked against an expiration date.

How could the contents of the register be protected from a would-be pirate? Software dumps are easy to get. ADR Vice-President Martin A. Goetz suggested that the identifier appear in a number of places scattered through the software.

As to cost, the register and instruction should be simple to build into new processors. Addition to existing machines might be a little more difficult but still entirely feasible and well within user cost objectives.

Why peel a little off... when you can cut it in half?

Commonwealth Computing Inc.

COMPUTER SYSTEMS & PUNCHED CARD EQUIPMENT BOUGHT AND SOLD

I-C-E

INTERNATIONAL COMPUTER EQUIPMENT, INC.

Corporate Headquarters:
1231 - 25th St., N.W.,
Washington, D.C. 20037
Tel. 202/293-3910
Offices:
Baltimore, Md. 301/539-5188
Los Angeles, Calif. 213/542-1501
San Francisco, Calif. 415/626-7157

Brochure on Request

A NEW GENERAL PURPOSE PAYROLL AT 1/4th USUAL COST...ALL STANDARD FEATURES...PLUS

Minimum Computer Equipment Configuration –

- IBM System 360 Model 30 or above
- 32K Core Including Supervisor
- Either Disk or Tape Oriented
- Disk May be Either 2311 or 2314
- 3 Tape Drives for Totally Tape Oriented System

A Multiple Company Service Payroll with Complete Flexibility for Reporting Regular Time, Overtime, Shift Premium, and Up to 8 Other Company Defined Payments. Extensive Tax Calculations.

PAY PERIODS – Weekly, Bi-Weekly, Semi-Monthly, Monthly

ACCUMULATION – By Quarter and Year-to-Date

OTHER FEATURES – Includes Multiple Checks and Automatic Deposits. Payroll and Labor Distribution from Same Input.

EXTENSIVE PERSONNEL INFORMATION – For Ready Retrieval TOTAL PRICE – $4500

INCLUDES –
- Complete Systems and Programming Documentation
- On-Site Customer Orientation & Instruction
- 1 Full Week Installation Assistance if Required
- 90 Day Guarantee Against Program or System Errors
- One Year Systems Maintenance Optional – $800

AVAILABLE – Delivery and Installation 60-90 Days from Contract

For Further Information Write or Call
GENERAL COMPUTER SERVICES, INC.
HUNTSVILLE INDUSTRIAL CENTER
P.O. Box 4163
Huntsville, Alabama 35802
(205) 539-9492

TLW Computerworld Corner
COMPUTERS FOR SALE

IBM – 1401 B4-Disk
A complete system, with disks and console inquiry. Printer 600 LPM, Punch/Read, Model I. Immediate Delivery.

GE 415
A complete 32K system. 1200 LPM printer, six 30 KC tapes. Excellent Bank system. August delivery.

IBM – 1440 – 12K
A large 12K system with many excellent features, 1442, 1443 (144 print positions), 1447 and three 1311 disks. June Delivery.

For 1401 System
IBM 1903 paper tape reader. A great buy for high paper tape input installation.

TLW does the total job. We have experience and satisfied customers.
Box 29763 Atlanta, Ga.
(404) 633-2579

TLW COMPUTER INDUSTRIES

Computer Has 3 Optional Cycle Times

A high-speed digital process control computer, the Bailey 855, has cycle times that are optionally 2 or 1 microseconds, or 750 nanoseconds.

Core can consist of 4K to 32K words of 25 bits plus parity, with optional additional bulk core of 64K to 512K words. The processor has 5 megahertz logic clock rate, binary and decimal arithmetic, hardware multiply and divide, and three hardware index registers.

The 855 is subdivided into eight time-sliced functional processors. Hardware logic performs transfer of control and register store-restore.

Hardware protection prevents a program error from affecting more than the functional processor in which it occurred. A functional processor can read out of any core location, but can write only into its own adjustable, assigned area.

Software for the Bailey 855 is featured by the On-Line Software System (OLSS), a package of process control-oriented supervisory programs.

The Programming Aid Software System (Pass) is used on an off-line 855, or in the background on an on-line 855. Pass includes a Fortran IV compiler, Meta-assembler, debugging programs, and Delta.

The latter is Bailey's Digital Engineering Language for Total Automation, a control language for District Digital Control, supervisory management, logic, and sequence control. Bailey Meter Co., Wickliffe, Ohio 44092.

Digital Delta Plotter

A new digital delta plotting system, Model 6030, operates either as an off-line system with input from punched cards, paper tape, or magnetic tape or as an on-line system.

The unit has a tiltable flat-bed

plotting surface available in three sizes (40 in. by 40 in., 40 in. by 60 in., or 60 in. by 60 in.). A Nixie-type display shows each coordinate as it enters the control.

Three format options are available (Fortran, Machine Tool, or Standard). Options available, either as original equipment or as add-on, include an alternate drum-style plotting surface for form paper, numeric-only and full alpha-numeric printers, vacuum hold-down, and input buffer. Auto-trol Corp., 6621 W. 56th Ave., Arvada, Colo. 80002.

New Products

Magnetic Tape

A new magnetic digital computer tape, D750 PG, is available for general-purpose applications. The supplier claims that the new tape undergoes statistical testing and has a 98% probability of first-pass, error-free operation at normal clipping levels.

The tape grade is made with the same binder formulation, Duramil 7, that is used for U.S. Government Type I, critical application tape. U.S. Magnetic Tape Co., Huntley, Ill. 60142.

Expandable Page Reader

A new expandable optical character recognition system, the 200, is a page reading system that gives the user a choice of

type fonts to match his immediate requirements. As the user's needs grow, he can add the capability for reading up to five fonts.

The unit reads upper- and lowercase alphabetics, numerics, punctuation, and symbols at 400 characters-per-second.

OCR-A, OCR-B, Elite (10 or 12 pitch), 1403, and hand-print reading capabilities are available. If a character is broken or smudged and unrecognizable, the character in context is presented on a CRT monitor, with the questionable character highlighted.

The operator simply strikes the correct letter on a typewriter keyboard and the information is recorded on the output device.

A set of hand-edit characters is read optionally, allowing the user to control source input from forms and text. Scan-Data Corp., 800 E. Main St., Morristown, Pa. 19401.

Multiple-Use Tape Punch

A perforated tape punch, the Ideal, is designed for correcting, blocking-out, or adding charac-

ters to all types of perforated tapes.

It has a transparent top plate which allows a clear view of the tape area to be punched. Accurately spaced feed-hole pins hold the tape securely while it is being punched.

The holes are punched with a hardened V-type hand punch for clean perforating. The unit will handle oiled, unoiled, or polyester laminated tape in all standard widths. Donauld, Inc., P.O. Box 104, Ridgewood, N.J. 07451.

Portable Terminal System

A new portable terminal system, the CSI, is designed for time-sharing users. The unit includes a Model 502 acoustic data coupler linked to a Model 33 Teletype, and comes packaged in a fiberglass case with wheels.

The terminal system is available with or without the paper-tape punch and reader. The acoustic data coupler is available separately and can be linked to Model 33, 35, and 37 Teletypes, graphic plotters, and other equipment with EIA interface.

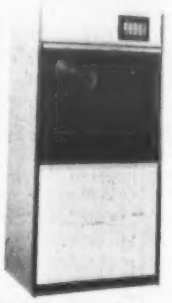
A magnetic receiver eliminates interference from local room noise. The unit will operate in either full or half-duplex mode. Transmission rates are up to 300 baud. Computer Solutions, Inc., 50 Washington Terrace, East Orange, N.J. 07018.

Compatible Tape Drives

New tape drives, the DatagraphiX F500 series integrated models, and 2500 series of stand-alone models have been designed to help minimize interface difficulties.

The tape drives are compatible with standard IBM 7 and 9-track NRZI and phase-encoded data formats. All units have single capstan drives and automatic tape feeds.

A reel of tape can be mounted on the drive, threaded over the permanently aligned tape path,



and positioned for use within 10 seconds. A quick release hold-down knob ensures reel alignment and prevents tape-edge damage.

Operator controls are on a single panel for simplicity and efficiency. Stromberg DatagraphiX, Inc., P.O. Box 2449, San Diego, Calif. 92112.

Data Acquisition System

A new computer-controlled axis positioning and data acquisition system, Datex CNC-1, simultaneously or independently positions and encodes four axes of shaft rotation.

The system consists of as many as four resolverdynes, an operator control console with axis display, interface electronics, and a high-speed, 16-bit computer with 4096-word storage.

The resolverdynes are non-contacting, absolute encoding devices with self-contained motors for driving a shaft. They provide a positioning resolution of one part in 36,000.

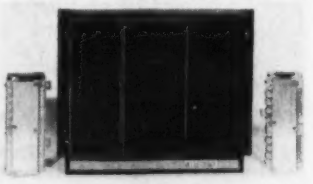
A proportional drive scheme provides shaft positioning with complete freedom of speed selection.

The operator control console includes a visual display of axes positions for controlling the resolverdynes for set-up or manual operation.

An alphanumeric teletypewriter printout is included as part of the computer. The basic system supplies logic commands for up to 11 external on-off functions. Datex Division of Conrac Corp., 1600 S. Mountain Ave., Duarte, Calif. 91011.

Machine Controller

A new, general-purpose. solid-state machine controller, PDP-14, has a central processing unit and a mechanically alterable



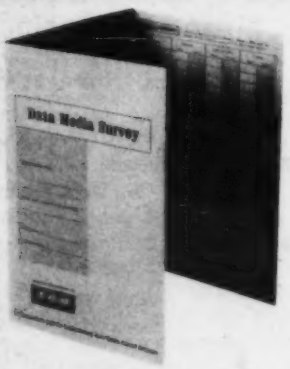
read-only memory. An interchangeable, hard-wired memory is designed to perform only a series of user-defined tasks.

Also included is interfacing which can be expanded to accommodate up to 256 inputs, such as limited switches and pushbuttons; and 255 outputs, such as motor-starters, solenoids, and indicators.

Basic unit price, without quantity discounts, is under $5000. First deliveries are scheduled to begin this summer. Digital Equipment Corp., Maynard, Mass. 01754.

Indexing-File Guides
TAB TITLES PRINTED TO YOUR SPECIFICATIONS
PLAIN TABS
LAMINATED TABS CLEAR OR COLORS
★ TAB CUTTING ★ DURABLE LAMINATED TABS
★ COLLATING & PUNCHING
★ BINDING REINFORCING
FOR
CATALOGS • PROPOSALS • INSTRUCTION MANUALS
Guides for Tub Files and all other unusual systems.
J. L. McINTOSH INC.
141 West 2nd St., Boston, Mass. 02127 (617) 268-7631

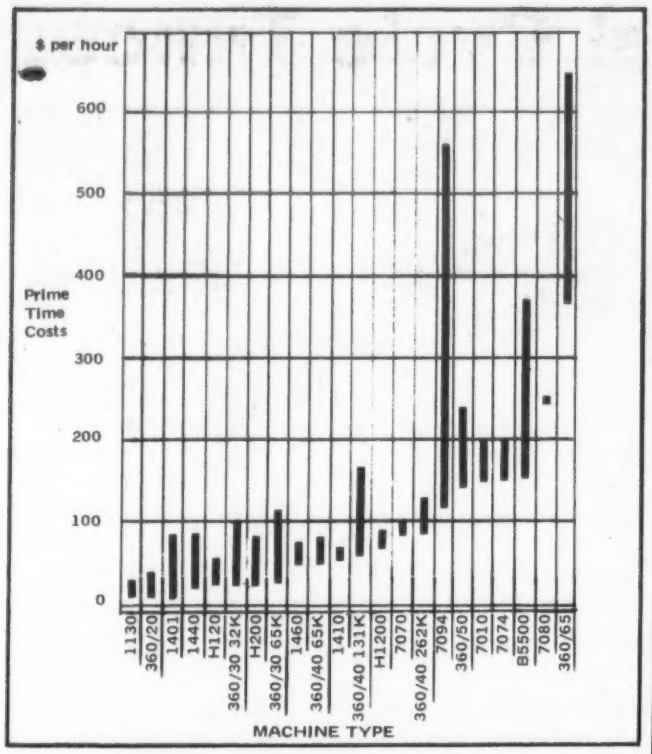
Computer Companion #786



Tab's Data Media Control System helps you make maximum use of your computers. How? By making sure all your Data Media – cards, tapes, disks, etc.– are stored and transported with the greatest efficiency. This system starts with our Data Media Control Survey which gives you a clear picture of your current data media inventory and handling capacity, and of your present and future requirements. We'll be glad to send you a copy, (and be glad to help you make your survey, without obligation). Write us.

TAB PRODUCTS CO.
633 Battery Street, San Francisco, Calif. 94111

COMPUTER TIME
In Washington D.C. Call – (202) 737-2256
TIME BROKERS, INC.
National Brokers of Computer Time
733 15th St. NW, Washington D.C. 20005



Cost Comparison

The open-market prices of an hour's prime time on various systems, as compiled by *Computer Time Report* for its winter 1969 issue. The lowest-priced systems are shown at the left, and the length of the line shows the time price range during 1968. For example, the price for a 360/30 with 65K ranged from $40 to $110 an hour, while the price for a Honeywell 1200 ranged from $60 to $80.

Army Command To Be Developed For ADP Systems

By a CW Staff Writer

FT. BELVOIR, Va. – A new Army command will be established March 31 to take responsibility for the design, development, test, installation, programming, and system support of all Army multicommand automatic data processing (ADP) systems.

Integrating the Army's ADP systems under a single design agency will improve efficiency in system development and use, an Army spokesman said. The new command will use the present Automatic Data Field Systems Command (ADFSC) as its nucleus and report directly to the Army assistant vice chief of staff, he said.

The task of the new command will range from worldwide administrative systems to worldwide combat support systems. It will embrace hardware and software systems support and will represent a broader scope of ADP systems responsibility than has ever before been brought together in a single Army agency, the spokesman said.

British Maker Considered for Six-Disk Packs

TORRANCE, Calif. – Wes Powers, president of Memory Magnetics, Inc., which markets Athana disk packs through its subsidiary Athana Corp., confirmed last week that MMI is considering using a British supplier for the six-disk packs used with IBM 1311 and 2311 systems.

MMI intends to concentrate on manufacturing the disk packs for the IBM 2314s. These involve considerably more sophisticated techniques than the smaller packs.

"I have the utmost admiration for British inventiveness and engineering capability, and I do not think we have taken enough advantage of it in the past," Powers told *Computerworld*.

The English firm, Master Tape Magnetic, Ltd., was formed about a year ago and is currently producing 1316-equivalent disk packs. Under the proposed arrangement, it would market American-produced 2316-equivalent disk packs in the United Kingdom, while Athana Corp. would market the British-produced 1316-equivalent in this country.

With regard to MMI's other major subsidiary, Linnell Electronics Corp., Powers confirmed that deliveries of the IBM 2311-compatible disk drives to evaluation test sites in government and industry had been made and that testing was now underway.

Currently Linnell has no president. The former president, James E. Linnell, recently left the firm.

SOFTWARE CLEARING HOUSE

If you want to sell proprietary software programs

OR

You are looking for software programs

USE

A professional EDP software clearing house

Contact

AUTOMATED INFORMATION SYSTEMS, INC.

BOX 304
NEEDHAM HEIGHTS 94, MASS. 02194
617-449-2220
Branches in Springfield, Mass. and Ridgewood, New Jersey

Why peel a little off... when you can cut it in half?

Commonwealth Computing Inc.

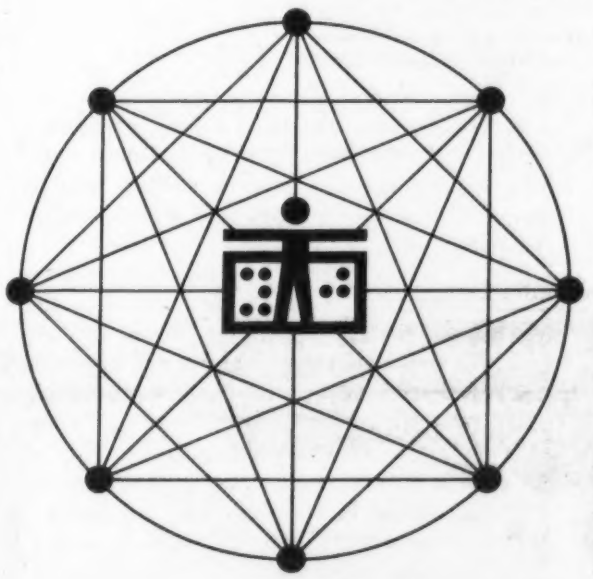
H-200, 1410, 1401's FOR SALE

IPS has several IBM and Honeywell systems for sale and delivery in the near future. An H-200 8K system with 3 20KC tapes is available now. IBM 1410's include an 80K with 2302 disc and 7330's, a 40K with 10 729's, and a 40K with 1402, 1403, and 9 7330's. Among the 1401's (all with 1402, 1403) are 8K and 4K card systems, a 12K tape system, a 16K tape/disc system, and a 4K with 2 1311's. A 1440 8K 2-1311 and a 1440 16K 3-1311 system are also available. For prices, delivery, and details, please call or write.

IPS

INFORMATION PROCESSING SYSTEMS, INC.
200 WEST 57TH STREET NEW YORK N.Y. 10019 (212) 246-2267

Boothe Computer Corporation announces the formation of a new subsidiary



Boothe Resources International, Inc.

offering a
full range
of professional capabilities
to help management
use computers and
data communication systems
profitably.

Offices in
New York, Chicago,
Los Angeles, Sacramento,
Toronto,
London, Zurich.

Boothe Resources
International, Inc.
One Maritime Plaza
San Francisco,
California 94111
Telephone (415) 989-6580

Subscribe to Computerworld see page 14

Editorials

A Worthwhile $2.00

It is an unusual item in the computer area which costs only $2 a month – and has the capability of changing systems. Yet this is the position of the new telephone "data access arrangement" interface which has now been delivered. The devices can provide an important flexibility which we previously have not had.

Just what their importance is has not yet clearly emerged, but it seems likely that with present day equipment they can change many apparently impractical communication systems into viable ones.

And that by itself is welcome.

Implications or Interests

The Vietnam resolution passed at a recent New York meeting of the ACM Special Interest Committee on the Social Implications of Computing (SICSIC) indicates that the members have overlooked the second half of the committee's name.

It is, of course, possible that there is a legitimate "social implication" in the use of computers in the Vietnam war. We can imagine, for instance, that if it were found that a standard programming system was resulting in untrained men being sent to the front, it would be an appropriate function of such a committee to confirm or deny the role of poor standardization of computer languages in such a tragedy.

However, no such event has so far been identified, and, frankly, we do not expect that there will be.

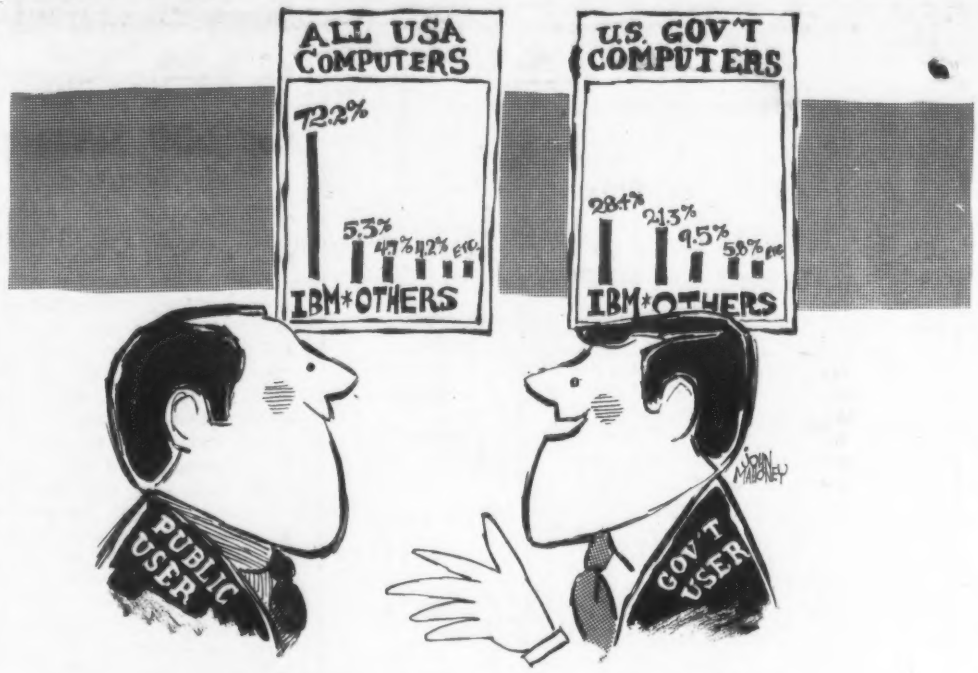
The fact that a number of ACM members happens to have a "special interest" in a political question such as Vietnam is admirable. But it should not blind them from seeing that an interest of some computer professionals is not the same thing as an implication of computers. If SICSIC is to perform its very important duties, it must be realized that it should restrict itself to the implications – and let the special interests of members go elsewhere.

The ACM-Afips Affair

Our call for a full explanation of why the ACM Council ratified the new Afips constitution at a time when the ACM had suddenly gone broke brought a response from an unexpected source – the treasurer of Afips. As we had called for an explanation from the ACM, not from Afips, his position was not too clear, but he argued that our facts were wrong, and called upon us to withdraw.

Regretfully, we are unable to do so. We still believe that a full explanation should be offered "as to why the ACM did not earlier foresee the financial problems it was heading into," as we said at the time.

Moreover, we feel this even more strongly as a result of the response from the Afips treasurer. This response brought home to us the number of times in which potential conflict of interest occurs in this case. The man who signed it is not only the Afips treasurer – he is also the ACM treasurer.



"One Difference Is That We Renegotiate Annually."

An Open Letter to CDC Chairman William Norris

One Standard...Or Two, Mr. Norris?

Dear Mr. Norris:

We have been following with considerable interest the development of computer marketing strategies in the wake of your suit against IBM. Our interest, of course, has been from the point of view of the user.

We are not particularly concerned about the comparative financial situation of Control Data Corp., IBM, or any of the other suppliers for that matter, except as it impinges on the services that a user may be able to obtain. After all, when a prospect is selecting his computer system, what matters to him is how that system will work, not how many dollars there are in the supplier's treasury. His choice is as real if the company has 2% of the market as if it has 92%.

During this study, which is still proceeding, we have come up with a basic question which we are unable to answer. It is one which affects all users because it involves the way in which they have to evaluate proposals. Although there has not been any decision, or even a hearing, on your antitrust suit against IBM – even now this question could affect people selecting their computers.

The question is, does Control Data advocate a single standard to be used while computer systems are being marketed, or does it ask for two standards? Does it ask that IBM be placed in a marketing situation that is more stringent than the situation that Control Data is willing to be in, or does Control Data merely wish to have a position equivalent to that of IBM?

We feel that this is important. If there are to be two standards – or even if it is your wish that there be two standards – then the methods that a computer user employs to evaluate the proposals of different manufacturers must vary. He must evaluate the IBM proposal one way, and the Control Data proposal differently. He will have to investigate and find the philosophy behind the marketing standards of each of the competitors before he can look into their proposals. This question is not being asked as a purely rhetorical one. Recently we have become aware of a situation in which Control Data is apparently using some of the marketing tactics that it complains IBM is using. The position on the warranties of the disk pack drives, for instance, appears to us to be such a situation. It seems both that an unnecessary standard is being used and that tie-in sales are being procured.

However, this is just one isolated incident which may be the exception that proves the rule, and therefore, the question must remain open.

So, Mr. Norris, we would like you to tell us, so that the user may know where he stands: is it one standard that you look for, or two in the marketing of computer systems?

Very truly yours,
Alan Taylor

Letters to the Editor

Poor Segmentation Distinguished From Virtual Memory's Virtues

Mr. Russel's recent letter (*Computerworld*, Feb. 5) about virtual memory contains at least one valid complaint – arbitrary segmentation of programs can cause overhead to be unbearably high. Unfortunately, the diatribe seems to be directed toward the virtual memory concept itself rather than against illogical and arbitrary segmentation.

For the past few years, I have been involved in efforts to enhance the storage allocation algorithms of the Burroughs B5500, both for the batch and time-sharing systems.

The emphasis in the design and implementation of these algorithms has been to increase their effectiveness whether used by novice or expert. It is obvious that a sufficiently sophisticated user can design a program to spoil the most beautiful allocation algorithm; the problem is to avoid letting the novice do this through ignorance.

Virtual memory systems today are at the same stage of their development that compilers were at not too many years back – everyone knows they are there, but since an expert can destroy their aim, they are worthless.

At the present status of the computing industry, such sentiments are remarkably old-fashioned.

One final comment: Mr. Russell claims that "some programs . . . could run for several days or weeks while using only a few minutes of CPU time." Not if you are leasing CPU time from the manufacturer; they couldn't. Never underestimate the power of greed to a computer manufacturer.

William W. Farley IV
Technical Staff
Remote Computing Corp.
Los Angeles, Calif.

Research Report

Most 'Score' Users Are Enthusiastic

By Joseph Hanlon
and Peter L. Briggs
CW Staff Writers

Score, a software package intended for file retrieval, Cobol program generation, and general file utility applications, runs on RCA, Honeywell, IBM, Univac, and Burroughs equipment, according to the developer, Programming Methods, Inc.

Included with the company's brochure describing Score is a list of several companies at which Score has been installed. This fact is, in itself unusual, and therefore *Computerworld* decided to carry out a partial check by contacting some of them.

Developer's Claims

The developer states that Score can:

- Reduce the number and skill-level of personnel required to implement a job.
- Reduce keypunching and keypunching errors.
- Reduce machine time for testing.
- Reduce or eliminate programming.
- Provide an effective means of standardizing retrieval and report generating functions.
- Minimize the cost of special-purpose runs.
- Function as a training aid for technical and nontechnical people.

The basic functions of Score include: Cobol source program generation, system-conversion aid, file retrieval, report generation, file generation, and generalized utility functions such as tape to disk, card to tape, etc.

We chose to contact one Burroughs user, one Honeywell user, three IBM 360 users, one Univac user, and one RCA user. With one exception, the reports we received regarding the usefulness of Score within these installations were favorable. The single exception pointed out that Score had been obtained without his consent (he had just joined the company) and he felt that he could have accomplished the same functions at less expense. In any case, he said, this company had no use for the file-retrieval aspects of Score.

Reports Generally Favorable

In general, the reports were favorable. Most users contacted felt that Score lived up to its claims. Certain points were brought out, however, which should be clarified. The Burroughs user said that the version for his machine was not available yet, and required about a month of work before it would be available. The Honeywell user pointed out that the package had needed alteration by the installation to incorporate it under the Mod 2 operating system, and it was still producing Mod 1-level programs.

Some reports were extremely favorable. One user said, "It takes a hell of a lot of the burden off our programmers. It does exactly what it is supposed to do with no fuss, no bother."

Cost Picture Favorable

Several users cited specific cost advantages. None of them had paid the full current price, and one of them said that he would not have bought it for that price because he was not allowed to spend over $5000 without budgetary approval. One DP manager estimated that Score would be able to produce 25 programs which would have cost the installation, by normal techniques, some $9800. He paid about half this for Score. Another user estimated that Score could save him $121 per program based on 50 programs over the next two years.

The price increase for Score came as a result of expanded features, such as the sort feature, according to the company. Several of the users purchased only part of Score, for which they paid $4500 to $7000. The current $7500 price appears to be negotiable, depending on the requirements for specific installations.

A few of the installations contacted had not had Score long enough to explore its capabilities fully. One point raised by a few of the users was that, without a pre-existent data base, the biggest advantages of the package were lost. These companies had not had time to prepare the data base prior to receiving the system.

Cobol Generation Valuable

Most of the users contacted felt that the Cobol-generation capability was extremely useful. The type of program which could be directly generated was limited to the type of functions used within Score, but the programs produced were in a format which could be easily altered. One company uses Score to generate all the basic programs including file descriptions, record descriptions, and general logic. They then alter the punched-card source to add the needed extra features.

Another function which most users complimented was that of report generation. Even the user who felt that he had very little use for Score pointed out that the report feature was excellent, and that he did use it occasionally. Ease of use and training were felt to be major advantages when using this type of package, and the users felt that Score met this need.

The Univac user pointed out that Score runs under Exec 8. He had generated only a few programs with it, but he felt that it would fulfill its functions excellently when the data base is available.

Detail Capabilities

Score includes the following detailed capabilities:

Information Retrieval: data can be retrieved from tape, disk, or card input and selection computations, or sampling conditions.

Sort: either selected data or entire files may be sorted on either tape or disk, with the user defining the desired data elements and their respective importance.

Computations: arithmetic computations can be performed and data can be generated as a result.

File Creation: tape, disk, and card files can be created as a result of the format specifications, while Score performs all needed reformatting, field delection and insertion, and calculations of output lengths.

Report Generation: the user specifies all spacing and format control, uses the editing functions, and total–level breaks, while Score numbers the pages and controls headings and skipping.

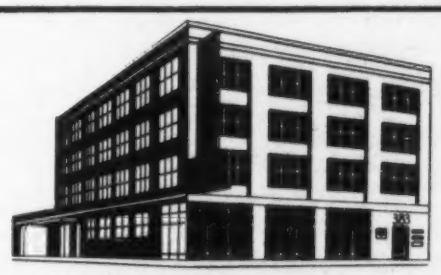
So far, the users we contacted are using Score only with trained programmers, so no information is available regarding the ease of learning by nonprogrammers. Some of the companies do plan to allow nonprogrammers to set up their own report-generation programs as they need them, however.

Atlantic Software, Inc. of Philadelphia and Programming Methods, Inc. of New York City are marketing Score.

Subscribe To
COMPUTERWORLD
$9.00 - 1 Year
60 Austin Street
Newton, Mass. 02160

Why peel a little off...
when you can cut it in half?

Commonwealth Computing Inc.



this here's the place!

1410
1411-A3,
1414-1, 1414-IV,
1415-1, 1402-2, 1403-2
Sealed Bids Accepted.
Enclose 10%
Deposit on Bid.
Opening Date
April 10th.

360/40
2040 G 131K, 1052-7,
(5) 2311's, 2841,
2403-2, 2401-1, 2401-2

7094
7109-2, 7110-1,
7151-2, 7155-2, 7271-2,
7302-1, 7606-2, 7607, 7608-1,
7617-1, 7618-1, 7909-1,
711-2, 716-1
Sealed Bids Accepted.
Enclose 10% dep. on Bid
Opening Date
April 10th.

360/30
2030 F 65K,
1051-N1, 1052-8,
1403-N1, 2821-5,
(3) 2311's, 2841-1,
2403-2

DISK
2311, 2841 CONTROL
TAPE
2401, 2403

call collect
212-673-9300

IOA

IOA DATA CORP., 383 Lafayette Street / New York, New York 10003
we *own* what we sell!

WANTED

729 Model V Tape Drives

Major Company wishes to purchase four (4) 729 Model V Tape Drives for 1969 delivery. Please supply complete information, serial numbers, delivery date, and price. Shenandoah Life Insurance Company, P.O. Box 2421, Roanoke, Virginia 24010

$5 MILLION AVAILABLE NOW TO BUY 3RD GENERATION COMPUTERS.

Write, wire, call

THE COMPUTER EXCHANGE INC.
30 East 42nd Street, New York, N.Y. 10017
(212) 661-5870

Custom Made Textbooks Now Available Using Computerized Retrieval, Printing

NEW YORK – With the help of a computer and modern printing techniques, schools can now order custom-made American history textbooks – and have them delivered within weeks.

Teachers can make their own choice of materials, combined in any order, from the 12,000 pages of the *Annals of America* series published by Encyclopaedia Britannica.

First of Its Kind

"The *Annals* is the first large set of reference books ever conceived for selective electronic composition and publishing. And as such, it is pointing the way towards a more versatile, individualized publishing industry," said N. Richard Miller, division vice-president and general manager, RCA Graphic Systems.

"Through the use of new information retrieval techniques and electronic composition equipment, teachers can select any material – down to a single paragraph – out of the more than 2200 articles in the *Annals* and have it put in a book just for their use," he said.

"This new combination of computers and electronic composition equipment makes it possible for school systems to select exactly what they want to teach in such areas as history, social studies, and political science," he added.

Five-Day Cycle

The entire cycle from the reception of an order to plate-ready film takes five days or less, a saving of roughly five weeks over conventional methods.

The system is simple to use. When a school system decides exactly which articles and which paragraphs of those articles are needed, an order is sent to the Chicago home office for processing.

After it is checked, the request is keypunched and fed into a computer specifying which selections and which portions of selections are to be printed and in what order.

The information is sorted to a master magnetic tape that is then sent to the Poole Clarinda Co. for typesetting.

At Poole, the tapes are translated into proper formats and necessary composition controls are added. Page proofs are created on an RCA Videocomp 70/830 at thousands or characters per second. An entire 400-page book of selections can be composed in less than a day.

After proofs have been checked by the *Annals* editors, they are returned to Poole and the Videocomp writes each page on film – ready for platemaking and the press.

Poor Shown More Likely To Be Labelled 'Retarded'

POMONA, Calif. – The stigma of mental retardation often is placed upon a child because of social and economic bias, a new computer-aided study shows.

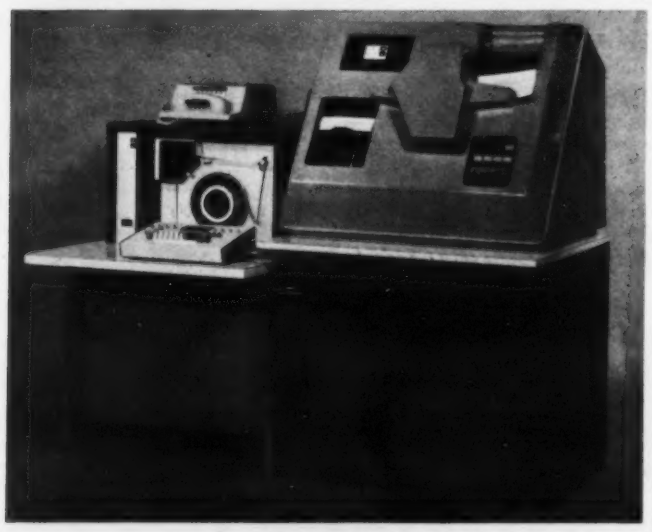
Researchers from the Socio-Economic Study Center for Mental Retardation at Pacific State Hospital here have been compiling facts from a cross-section community survey of Riverside – a city of 135,000 persons approximately 100 miles east of Los Angeles – since 1963.

Data compiled by the researchers, primarily from interviews, goes into a Honeywell Model 1200 computer at the center for analysis.

"What we have found most interesting so far in the Riverside study," said Dr. Richard K. Eyman, center director, "is how the label – the stigma really – of mental retardation is placed on a child. It tends, in many cases, to follow socio-economic bias.

"In other words, a minority group child whose family is also in a lower income group is more likely to be tagged mentally retarded by the community than is his middle-class neighbor," Dr. Eyman said.

"This is unfortunate and unfair. In our society the label 'retarded' does carry a social stigma. It implies an incurable condition. But the fact is, a great many of these children simply have a temporary learning problem," he added.



MOHAWK DATA-RECORDER/6013 CARD PUNCH

Every day is "Be Kind to Your Computer" day... with this MDS off-line team

If your computer could speak its mind, you can be sure it would shout "Stop using me as the input medium for a card punch. It just isn't in my class... it can't keep up with me!"

MDS is still head over magnetic tape in the business of eliminating punched cards for input preparation. But since punched card *output* is important for many applications, we've put our experience to work for you in this area, too.

Punched cards are generated more efficiently, more economically, *off-line*, with this MDS 6013 Card Punch and Mohawk Data-Recorder.

Naturally, you can use the Data-Recorder for routine data entry direct to magnetic tape, and verification. If desired, you also can have data transmission, with the received data recorded automatically on magnetic tape for conversion to cards.

The 6013 Card Punch can be interfaced with any of eight Data-Recorder models... provides punched card output from the Data-Recorder's magnetic tape. The 6013 is an 80-column unit, equipped with Echo Check for punching accuracy. Rated speed is 200 cards/minute. Card punching mechanism is modular, plug-in punch head matched to a complete card transport system.

If card punching is making a nervous wreck of your computer, this MDS combination can help bring it back to a state of calm efficiency. Ask us for complete details.

MOHAWK DATA SCIENCES CORP. MDS
P.O. Box 630 • Palisade Street, Herkimer, New York 13350

OFFICES IN MAJOR MARKETS OF THE U.S.A., AND AROUND THE WORLD

Why peel a little off... when you can cut it in half?

Commonwealth Computing Inc.

DATA RETRIEVAL AND STATISTICAL COMPILER

DESIGNED FOR ADMINISTRATION AND RESEARCH. USES SIMPLIFIED ENGLISH SENTENCES. SELECTS RECORDS FROM TAPE OR DISC BASED ON ANY LOGICAL CRITERIA. PRINTS SUMMARIES WITH HEADINGS. COMPUTES TOTALS (3 LEVELS OF BREAKDOWN). COMPUTES MEAN, VARIANCE, RANGE, MEDIAN AND MODE. WRITTEN IN COBOL. PRODUCES A COBOL PROGRAM. WRITE FOR BROCHURE. AVAILABLE FOR PURCHASE OR LEASE.

U.S. Systems & Software, Inc.
2125 South Manchester Avenue
Anaheim, California 92802
(714) 633-9231

PROJECT TELETYPE® PRINTOUTS

New TyProjector® Opaque Projector Mounts on Model 33 Teletype® for Group Viewing of Typed Material

- Simple to use; No Teletype modifications
- For groups of up to 100 viewers
- Projects line being typed, and 19 preceding lines

bbn BOLT BERANEK & NEWMAN INC.
DATA EQUIPMENT DIVISION
2126 South Lyon Street
Santa Ana, California 92705
Telephone: 714/546-5300

Go placidly amid the noise & haste, & remember what peace there may be in silence. As far as possible without surrender be on good terms with all persons. Speak your truth quietly & clearly; and listen to others, even the dull & ignorant; they too have their story. Avoid loud & aggressive persons, they are vexations to the spirit. If you compare yourself with others, you may become vain & bitter; for always there will be greater & lesser persons than yourself. Enjoy your achievements as well as your plans. Keep interested in your own career, however humble; it is a real possession in the changing fortunes of time. Exercise caution in your business affairs; for the world is full of trickery. But let this not blind you to what virtue there is; many persons strive for high ideals; and everywhere life is full of heroism. Be yourself. Especially, do not feign affection. Neither be cynical about love; for in the face of all aridity & disenchantment it is perennial as the grass. Take kindly the counsel of the years, gracefully surrendering the things of youth. Nurture strength of spirit to shield you in sudden misfortune. But do not distress yourself with imaginings. Many fears are born of fatigue & loneliness. Beyond a wholesome discipline, be gentle with yourself. You are a child of the universe, no less than the trees & the stars; you have a right to be here. And whether or not it is clear to you, no doubt the universe is unfolding as it should. Therefore be at peace with God, whatever you conceive Him to be, and whatever your labors & aspirations, in the noisy confusion of life keep peace with your soul. With all its sham, drudgery & broken dreams, it is still a beautiful world. Be careful. Strive to be happy.

DESIDERATA, FOUND IN OLD SAINT PAUL'S CHURCH, BALTIMORE; DATED 1692

Reprints of DESIDERATA, on 14x18 Strathmore Beau Brilliant, are available on request from **URS Data Sciences Company**—a computer software organization that is actively seeking professional staff with a minimum of three years experience in systems design or implementation. Address your request to Frederic Howell, Director of Personnel/**URS Data Sciences Company**/1700 South El Camino Real/San Mateo, California 94402. An equal opportunity employer—by choice!

URS

Why try to peel a little off your programming costs...

Doesn't matter how sharp you are.

Today it's tough just to trim your 360 programming costs.

So where do we get off . . . offering to cut them in half?

Applesauce, you say. (Nobody's even offered to do them at my costs.) Haven't we heard about the work you're still running in emulation? Don't we realize the amount of testing that's backed up on you? The shortage of 360 programmers you're facing? Those RPQ's that keep pouring in from your divisions or departments — demanding everything from minor program changes to complete new systems?

Of course we know. But we don't care how big your barrel of programs and problems has grown.

We'll do one — or a thousand — of your 360's for half the charges you'd incur doing the work inside on your own time, with your own resources, with our present approach. One soft spot: we haven't sliced our way through the 360/20 yet.

And we'll give you finished programs. All de-bugged, tested, ready to go on the air. That includes standard DOS, TOS and OS modules, as well as BPS stand-alone programs.

COMPUTERWORLD

MINI COMPUTER SUPPLEMENT

March 26, 1969

The Newest Entry- Just Unveiled

The Honeywell H-316, the fourth and smallest in the company's Series 16 line of scientific and control computers.

The Big Boys Are Moving Toward The High Potential Mini-Market

By a CW Staff Writer

While the mini-computer market has been predominantly controlled by smaller manufacturers, it has been receiving more attention from the mainline computer manufacturers.

Two firms in the big eight have recently offered small computers, but in a very different manner. Honeywell has offered a straight mini computer, the H-316, while Burroughs Corp. has offered application-oriented terminal systems like the L-2000 which uses Firmware.

(From the user's point of view, "Firmware" means that the manufacturer's or supplier's furnished software can be changed or modified only by the manufacturer or supplier.)

High-Level Attention

The Burroughs system was announced late in February and was given unusual attention, with chairman Ray W. MacDonald calling the hardware "the most fundamental design advance in this size and class of accounting and billing equipment in the last 60 years."

The L-1000 is basically an off-line version of the TC-500 terminal computer but with special microprogramming, called Firmware, on a disk memory. This microprogramming provides a lot of the input/output, controls, print format, etc., so that the user programs can be very simple.

The L-1000 sells for between $11,000 and $20,000 and is attracting additional attention because Burroughs has chosen to initiate the selling of software separately from hardware. Application programs are available at a cost of between $650 and $900 per application, or about 8% of the hardware cost.

Reduced Version

However, Burroughs was not long in the market when the Computer Control Division of Honeywell announced their system in early March, 1969. This system is priced under $10,000 and is called the H-316. Marketing started early and over 200 orders were placed before the announcement date. Basically, it is a lower priced and slower version of the DDP-516 computer and would appear to be aimed at the same market as the 516 but in a different price range.

Because of its identity with its larger brother, the H-316 comes with a software library and the capability handling of multilevel real-time programs. Honeywell, unlike Burroughs, has taken the approach that the H-316 user will do a considerable amount of programming himself.

The full import of these announcements has not yet been felt, but might indicate that a price war will develop in the mini-computer market and that the giants of the industry will be in there hitting hard.

Does It Concern You, Yet?

Mini Computers Kindle Interest in Managers

"I work with real digital computers, like the Burroughs and Honeywell systems — not with process control!"

Although this statement is still prevalent among data processing managers, it is not as prevalent as a year ago. It is an attitude which has made most mini computer salesmen stay away from the data processing department and has helped other departments obtain their own independence — and frequently more efficient computer facilities.

No Hand-Holding Charge

Mini computers are different. Traditionally, a user has received less support in applications programming, and in some cases has received just the bare bones of the hardware. Users have been sold systems on the assumption that they know how to use them better than the manufacturer does and therefore, no increase in price over raw hardware is necessary. Users and prospects have felt that the real reason for the system being priced under that of main-line computers with similar capacity has been the lack of additional software or hand-holding charges.

This is a true statement. Originally, mini computers would spring from the process control computer and would not have a large mark-up for software or support services. Even now, the proportion of the price that goes to these areas is considerably less than the equivalent for mainline computers. But, the assumption that a user cannot make use of a mini computer unless he has in-house technical capabilities approaching the PhD standard is no longer true.

Increased Market

The key facts are:

The price of mini computers has dropped tremendously — not because the support has been reduced, but because the market has been so increased that mass production techniques are now possible where they were not a few years ago.

There is a greater increase in the available skills needed to keep mini computers running. The PhD is no longer the only person who can do this.

There is also a major demand for mini computers coming from the main computer area. This comes primarily because of overloading and consequent inefficiencies caused by operating systems, and by the requirements of new computerized networks which are being built.

Evaluating One By One

The price situation is fairly self-evident. Present systems cost only about half of what they would have cost two years ago — insofar as the central processor is concerned.

Systems can be purchased for $10,000 to $15,000 and are quite respectable at this price. This means that the cost of a computer is often less than the cost of another skilled employee.

The improvement in skills has resulted from the reduction in the amount of skill required to run the computers. Application packages are being added rapidly that can be run by anyone familiar with the job that the computer is to assist.

Instead of selling computers, Business Information Technology, Inc., for instance, sells applications to the numerical control field and calls them Numericon. From the buyer's point of view, the important things are the types of angle cuts, the contour cuts, the operation of the parts programmer, and its relation to the machine tools that are in-house. This approach is typical of the changing designs, and means that the number of people that can use the system successfully has jumped significantly.

While the mini computers have been smoothing their interface with the outside world, other developments have been increasing the demand for mini computers — primarily the realization of exactly what a job is and how it is done.

A typical example of this is to be found on Wall Street, which is about as far as one can get from the process control area. Wall Street has been using the computer for a number of years for very specific back-office tasks.

Knowledge of how to perform a particular operation has often been painfully gained through the use of general-purpose computers. And, the general-purpose mainline computers carry excess charges even when the application support is no longer needed — particularly when a computer is left on a single task.

Mini computers are moving into the Wall Street operations to handle specific back-room jobs. Infocom, for instance, has a package that gives daily activity records of all trades, updates all permanent records, and makes inquiries into permanent records — all on a mini computer.

In the following pages we will look at some other items that show where the mini computer is going. Clearly it is going — and growing — and is now invading territory thought to be sacrosanct to mainline computers. The mini offers economy and the ability to take routine jobs from the data processing department. Therefore, it is of interest to everyone in the industry.

On The Inside

Mini Shapes Differ 2
Are Minis Efficient? 4
Dedicated Minis 5
Minis in the Future 6
Reliability and the User 7

Minis Are Small-Sized, But Shapes Do Differ

What is a "Mini" Computer?

Generally it is a small, general-purpose digital computer with a central processor and core memory (approximately 4096 words), and weighs about 85 pounds. The cabinet holding these two components would be about the size of an electric typewriter. It has a small word-size, 12 bit or less, and is economically priced, usually from $4000 to $13,000.

Where Minis Are Used

Mostly they are used in the on-line, real-time environment and are built into larger systems as special-purpose data reducers and controllers.

A user who is considering the purchase of a miniature computer should first carefully evaluate the system to be sure it is the right one for the job he wants to do. Current machines vary in word lengths, input/output facilities, instruction sets, software, and performance.

Be sure the computer will not limit total system performance or operate too near its maximum capacity or speed. If it has more capacity than is required, additional programming functions or options can be added to provide additional performance value. If the system uses only a portion of the memory, be sure that additional programs can be added. It should be possible to add programs to increase the speed and efficiency of the system, additional hardware may be necessary — such as extra memory. Being able to expand quickly and at a minimal cost is important.

Input/Output Options

Once the system is operating effectively, additional speed may be required for punching a large volume of tape. So, it is necessary to know if the supplier can offer high-speed paper tape readers, punches, and printers.

These are the traditional types of peripherals common to data processing rooms. However, mini computers can use several different peripherals; frequently more specialized than the standard peripherals.

For instance, the Hewlett-Packard schoolroom computer is equipped with a teleprinter, allowing an entire class to program a computer simultaneously using tab cards marked with an ordinary soft-lead pencil. It also features an optical mark reader, eliminating the need for traditional punched cards. This means that the students can program at their desk and drop programs straight into the card readers without keypunching or operator intervention.

Some Systems Will Expand

Other systems will expand to include storage of large volumes of data and/or programs. Mass storage devices, although slower than core memory, are less expensive. The ability to add magnetic disk or tape storage is important, and you can probably realize substantial savings if the supplier manufactures his own peripherals.

While most computers can be interfaced, a good miniature computer will have the interface built-in. Be sure to investigate this requirement thoroughly.

Software Essential

If programs are going to be changed frequently, software is important. Systems software should be investigated as well as:

Diagnostics — These are important in trouble-shooting the equipment. Good diagnostics will mean less downtime.

Special programs — Programs like a general-purpose calculator and Fortran will allow use of the computer for off-hours computational and engineering duties.

Subroutines — These are small programs which can be patched into larger programs.

Peripheral software — Even though the manufacturer may offer peripherals such as tape and disks, this does not mean you can use them without the software.

Note These Addresses

The number of mini-computer manufacturers is growing almost daily, but here is a list of some of the major manufacturers. Inquiries addressed to them should give details of your own particular problem if they are to be answered quickly.

Data General	*Cox Street, Hudson, Mass.*
Business Info Technology	*3 Erie Drive, Natick, Mass.*
Digital Equipment	*146 Main Street, Maynard, Mass.*
Hewlett-Packard	*1501 Page Mill Road, Palo Alto, Calif.*
General Electric	*2255 W. Desert Cove Rd., Phoenix, Ariz.*
IBM Corp.	*112 East Post Road, White Plains, N.Y.*
Interdata	*2 Crescent Place, Oceanport, N.J.*
K & M Electronics Associates, Inc.	*109 Hopkins Place, Baltimore, Md.*
Litton Automated Business Systems	*8000 Wooley Ave., Van Nuys, Calif.*
Motorola Instrument and Control	*P.O. Box 5409, Phoenix, Ariz.*
Raytheon Computer	*141 Spring Lane, Lexington, Mass.*
Systems Engineering Labs	*6901 W. Sunrise Blvd., Ft. Lauderdale, Fla.*
Scientific Control	*P.O. Box 34529, Dallas, Texas*
Univac	*P.O. Box 8100, Philadelphia, Pa.*
Varian Data Machines	*2722 Michelson Dr., Irvine, Calif.*
Honeywell Computer Control	*Old Connecticut Path, Framingham, Mass.*
Wang Laboratories	*836 North Street, Tewksbury, Mass.*

But There Are Problems In Understanding

William Carey of the Town and Country Jewelry Co. in Massachusetts bought a mini computer from a well-known and reputable firm to do his billing.

The system was to work at 10.5 characters per second and Carey wasn't surprised to find that the actual speed was less than that. He would have settled for an average of 9 characters per second, but it appears that he is getting only about one-third of that.

"I was oversold," he told *Computerworld*, "and now I don't know what to do. I have my peak billing season coming up and the machines won't keep up with it."

The performance characteristic of 10.5 characters per second is the physical limitation of the printer of this system, but this does not take into account any of the delays due to programming.

"If programming is the cause," he said, "then I think the specifications in the brochure should reflect the system after programming."

The supplier seemed surprised when he suggested that the programming was at fault. They suggested that he wait until the system settled down, but Carey isn't convinced.

Whatever the facts may be, this case illustrates that there can be a dangerous discrepancy between maximum performance of a system and actual performance under operating conditions.

MINI-TAPES

Heavy duty, extra strength, 1.5 mil mylar, 300 feet length, 1/2 inch width, 800 BPI. Full width tested, on clear front 6-1/4 inch diameter plastic reel, protective strap and sealed in scuff-proof clear polyethelene bag.

$7.95 per reel — Quantity discounts

Lowest prices on all lengths of 800 BPI and 1600 BPI tape.

WESTMINISTER COMPUTER, LTD.

P. O. Box 5256
Philadelphia, Pa. 19126

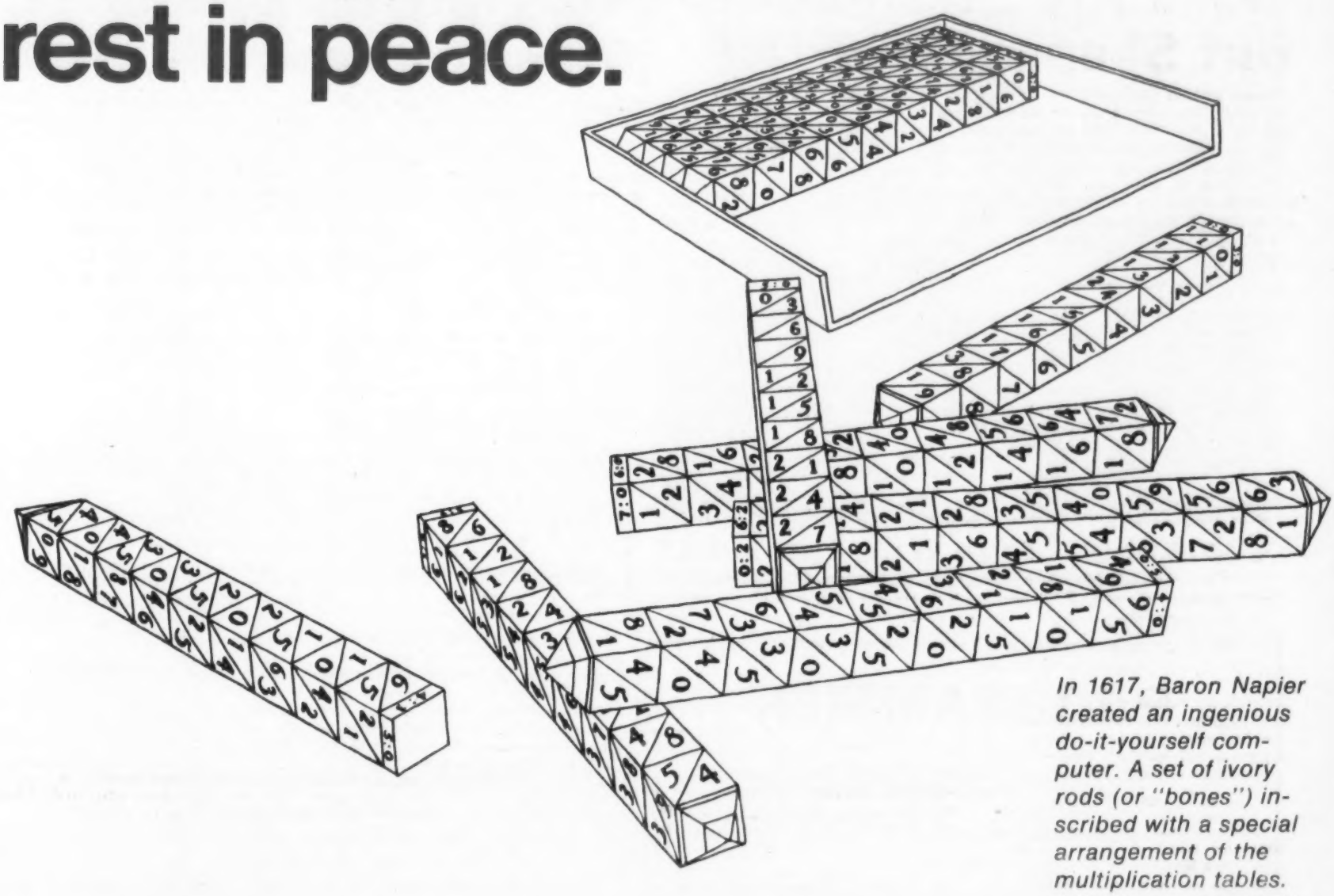
Small Computer Software Company

Our four programmers will work with all makes of small computers. We use a time-share terminal for fast editing, compiling, and debugging of core length programs for the PDP-8. We provide quick, efficient service with full documentation.

We also program for all time-share systems and languages.

Bos 582
Attleboro, Mass. 02703 or
call 617/222-9063

May Napier's bones rest in peace.



In 1617, Baron Napier created an ingenious do-it-yourself computer. A set of ivory rods (or "bones") inscribed with a special arrangement of the multiplication tables. With these, you could go from a problem to a square root faster than man had ever gone before.

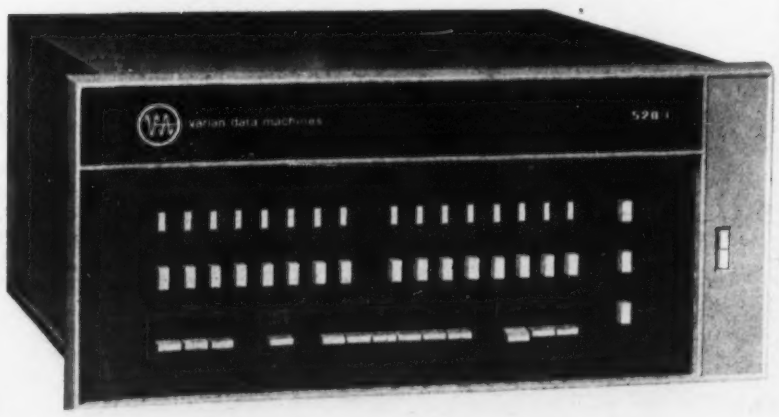
They taught previous computers a trick or two. Which brings us to Varian Data's 520/i.

The 520/i was designed to tackle dual programs for the price of a one-track mind computer.

That took some doing. Such as handling arithmetic functions in 8, 16, 24 or 32 bit lengths within the same program—with precision changeability at any time.

Hardware includes two 32-bit accumulators, two 16-bit index registers, two program counters and two overflow registers. Plus eleven interrupt lines. And its 1.5 μs memory is expandable from 4K to 32K bytes.

The price of our paragon? Just $7,500. Considerably more than Napier's bones—and considerably less than any comparable computer. Why not write for your brochure today?



varian data machines

a varian subsidiary/
2722 Michelson Drive/Irvine/California 92664
(714) 833-2400

SALES OFFICES: U.S., San Diego, Santa Monica and San Francisco, California; Vernon and Westport, Connecticut; Chicago, Illinois; Houston, Texas; Fort Washington, Pennsylvania; Washington, D.C.; Waltham, Massachusetts. INTERNATIONAL: Australia, Belgium, Canada, France, Germany, India, Italy, South Africa, Sweden, Switzerland, United Kingdom and Ireland.

Computers Move With The Times

One of the advantages of mini computers is that you can move them around. Above is a prototype of this type of operation in Asia where supply units use NCR 500 transportable systems in vans.

Now Minis Can Handle DP – Economically, Too

Minis have been able to handle business data processing problems for several years. Firms using a small computer for engineering purposes have frequently written business programs and there are a number of routines for handling truncation and rounding problems to keep the cents straight. Obviously it is a waste of good computer time to use an outside service bureau when you have a computer of your own.

Efficiency Questioned

More recently, however, a new question has been raised – whether mini computers can, in fact, handle business data processing efficiently with just minimal programming costs.

As recently as a year ago, the answer was clearly "no." It wasn't that the systems did not have the power. The point was that they did not have the necessary tools. Business data processing has taken some ten years to develop a set of tools for large-scale digital computers; and for all practical purposes, it is not economically feasible to do without them.

Tools Now Available

During the past year the tools for minis have become available. One of the most dramatic cases is the Saibol language which is available from Infocom, Inc., Wellesley Hills, Mass. Saibol was developed by Dr. Wilbur Highleyman of Sombers Associates, Inc., Lake Hiawatha, N.J., and named after his firm, SAI, and Business Oriented Language. In many ways the language resembles Cobol, a popular business language used for many years on large-scale computers.

Using this as a base, Infocom has been developing a series of application packages including payroll and labor accounting programs for accurate paychecks, proper maintenance of employees' earnings records, taxes, and a listing of management and labor costs. There is also an inventory control program for reduction of inventory investment providing clerical requirements for manual transcription as well as error from manual transcription.

Some of the Advantages

Among the advantages to be gained through the use of a small computer are complete and accurate billing, paper or magnetic tape records, open item and balance forward processing, and automatic invoice printing and activity reports.

Infocom, for instance, points out that minis can reduce peak loads and end-of-month accounting, account for incurred liabilities, and allocate expenses to proper departments or accounts.

Using the small computers for job cost analysis can also result in increased profits. Time and materials are quickly posted to each job and progress against job estimates by department are easily obtained.

PROGRAMMER

PART TIME industrial and commercial systems applications and programming on SMALL COMPUTERS . . . extended experience required on MINI-PROCESSORS . . . high level compensation plus profit sharing based on results. Boston suburban.

Box No. 3043

ROBERT SWINNEY & ASSOCIATES • 1130 Group
Information Processing Consultants
Our 1130 specialists are PROFESSIONALS
Call us at (913) 362-2288
P.O.Box 3934 • Kansas City, Kansas 66103

Subscribe to

COMPUTERWORLD

Today

OWN

Your weekly copy of *COMPUTERWORLD* will keep you up to date! Every week you'll find news that is of interest and importance to the computer community – all of it – the people who design computers, the people who analyze how they are to be used, the people who program them, and the people who manage them.

Your weekly copy of *COMPUTERWORLD* gives you news on key developments in computer application techniques . . . software . . . equipment design . . . industry developments . . . personnel changes . . . job trends . . . new-installations . . . and complete financial and stock information.

Join the action people today – sign up for your weekly copy of *COMPUTERWORLD*.

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY
SIXTY AUSTIN STREET, NEWTON, MASSACHUSETTS • 02160 • TELEPHONE: (617) 332-5606

Yes, please send me COMPUTERWORLD for . . .

☐ 1 Year $ 9.00
☐ 2 Years $16.00 ☐ Bill Me
☐ 3 Years $20.00 ☐ Payment Enclosed

AA

Name
Your Title
Co. Name
Address
City
Zip Code

Return to:
COMPUTERWORLD 60 Austin Street, Newton, Mass. 02160

Please Circle 1 Number and 1 Letter:

YOUR TITLE AND/OR FUNCTION?
A. Operational Management (nonengineering)
B. Computer Professional Staff
C. Corporate Officers
D. Engineering Management
E. Engineering/Scientific
F. Production/Maintenance
G. Sales/Marketing
H. Other

COMPANY BUSINESS:
1. Mining or Construction
2. Manufacturer/Computer or Data System
3. Manufacturer/Other
4. Utility
5. Wholesale/Retail
6. Finance
7. Consultants/DP Services
8. Business Service (except DP)
9. Educational/Medical/Legal
10. Government/Military
11. Other

Dedication Is Often 'THE' Way To Use Mini Computer Systems

A major present-day use of mini computers is in the handling of dedicated systems. A dedicated system is a computer system having one and only one task to perform. This was the way that process control computers worked, but with recent price reductions it has become economic to handle many other operations on a dedicated system.

One such application for small data processors is the supervision and control of a remote, unattended station. This application permits an expansion of supervisory control function at the remote station by exploitation of the small computer as a data gathering and control center, a data logger, and a supervisory control computer.

In one case, a Motorola MDP-1000 is being used as the central element in a hardwired supervisory system controlling a multistation power network. The machine performs four prime functions at the remote power station.

Transmits for Display

- It receives control commands from a central station and operates the circuit breakers.
- It stores data, and upon request of the central station, converts the data to binary coded decimal form and transmits it to the central station for display.
- It scans ampere quantities every two minutes and performs high-limit checks for out-of-limit alarming.
- It logs data on-the-hour and lists all out-of-limit alarms still existing at that time, and it logs circuit-breaker status changes in the order in which they occur, alarming the dispatcher in the event of abnormal operation.

The system also reports changes to the central station as soon as they occur. When the central station issues a control command, the small data processor accepts the command, checks it for validity by performing multiple security checks, and decodes it. The computer then sends a signal via appropriate digital command module in the I/O network to operate the correct interpose relay of the two provided for each circuit-breaker. One relay closes the circuit-breaker, the other trips it.

When the command has been carried out, a signal is returned through the correct I/O module to this effect. The computer challenges this signal and requires that its correctness be verified. When correctness is confirmed, it initiates a change of status signal to the central station, which changes the status display at the central station. Status indications also are logged locally. Time of occurrence is added automatically as part of the logging routine. Should power fail, the unit automatically begins operation on emergency power and continues the data gathering function while accepting and executing control commands.

The Present Is Not The Limit

The current market position of mini computers is misleading as they are an infant offshoot of an industry still in its infancy. The growth of the mini market in today's market cannot be extrapolated to indicate future growth. It is more important to investigate the areas in which mini computer characteristics will be of value in future developments.

The prime characteristics of minis are low initial cost and minimal programming, applied to a situation not previously economic.

On page 3 we decribe how minis can handle data processing jobs economically, but there are other ways of using them. A dedicated system – where the user rarely does any programming and where the system stays with a single program – is one of the major ways of using minis. Most applications today are still rather specialized, but the time is coming when they will become much more general.

The Mini Future Is In Computer Area And Also Outside

Typical future uses for dedicated minis include some inside the main computer field and some outside. Inside, there will be terminal controllers at remote sites where minis are being used to reduce overloads on large computer systems.

The trend has not attracted too much attention as the first terminal computers were developed by large firms such as IBM, Burroughs, and Honeywell who disguised the terminal systems and played down the power of the system.

Variety of Duties

However, mini computers are now powering stock exchange terminals, time-sharing systems, and helping with message switching and routine jobs. In the future we can expect to see minis handling formatting, report creation, and special information retrieval.

Mag tape too expensive? Punched tape too slow?

Your small computer deserves PEC data power!

High Speed—Low Price

Seems a shame to shackle that fast new computer of yours with slow, maintenance-prone punched tape. Yet digital magnetic tape recorders are so expensive.

Not now, they aren't.

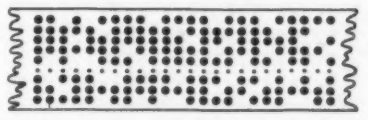
PEC can give your small computer real write/read data power. 10 KHz data transfer rates for as low as $2,500. 20 KHz transfer rates for $3,500 (quantities of 100).

Discriminating computer users are demanding higher input/output performance on even the smallest machines.

That's why more and more major computer manufacturers are offering PEC digital magnetic tape recorders as standard equipment.

Insist on low cost-high performance PEC data power for your computer.

Compare With Punched Tape

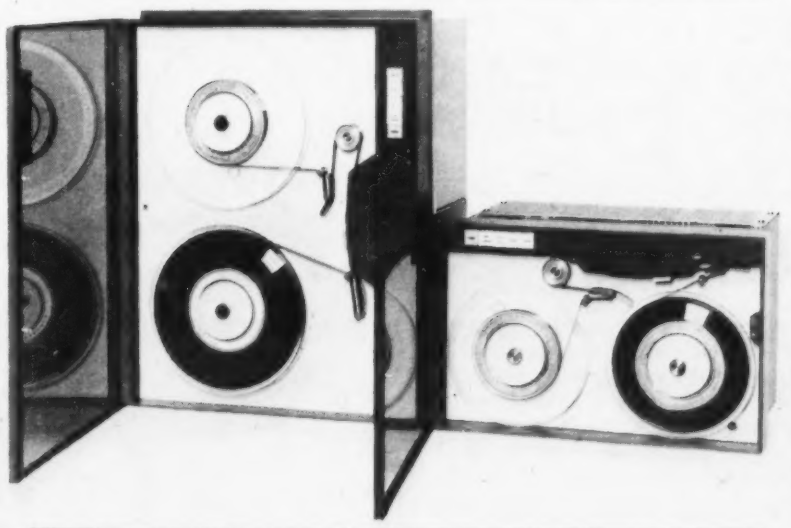


You can store ten characters on an inch of punched tape. You can store up to 800 characters on an inch of magnetic tape. That's 80 times more data per inch!

What about data transfer rates? A paper tape perforator plods along at 150 characters a second. Pretty slow for today's fast computers.

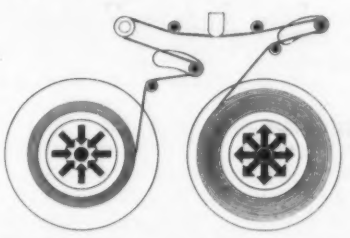
PEC digital magnetic tape recorders zip data in and out at speeds to 25 ips. Data transfer rates up to 20 KHz. That's 133 times faster than punched tape.

PEC data power costs just a little more than punched tape. Yet look at the tremendous increase in storage capacity and data transfer rates you get.



Compare With Other Mag Tape Models

PEC digital magnetic tape recorders use an elegantly simple single capstan velocity servo system. Pinch roller, a major source of skew and tape wear, is eliminated.



PEC recorders cost half as much as competitive makes, yet perform even better.

IBM compatible? You bet. Including the precise requirements for System/360, 9 channel, 800 bpi operation.

Choose the speed you want from 4 to 25 ips, at 800, 556, or 200 bpi. 7 track dual density available too. And up to 4 PEC recorders can operate from a single computer.

Select the data capacity, transfer rate, rack height and price from 3 distinct models.

Three Reel Sizes

Reel Size	Max. Transfer Rates	Tape capacity
7 inch	10 KHz	600 feet
8½ inch	20 KHz	1200 feet
10½ inch	20 KHz	2400 feet

PEC also makes synchronous write-only and read-only recorders. A complete line of incremental models too. Perfect for data acquisition systems, off-line plotters, line printers, and data terminals. Perfect for just about any input or output requirement, for that matter.

Write or phone today for our 8 page brochure.

PEC PERIPHERAL EQUIPMENT CORPORATION
9551 Irondale Avenue ■ Chatsworth, California 91311 ■ (213) 882-0030 ■ TWX (910) 494-2093

The Real Change May Be In How Minis Can Alter Environments

One of the major new uses of mini computers may be simply to do a job that is currently being done, but at the same time adding more management control and producing better systems information. In so doing, a job can be drastically transformed, and the addition of a mini computer *could change an environment.*

There are only a few cases of this in actual practice. One is in the keypunch room. Keypunching, or data entry which may prove to be a better phrase in the future, involves a number of girls transcribing data onto computer readable material, such as cards, tape, or cartridges. Until recently, each unit was a separate stand-alone unit with such standards as the IBM 026 and 029 card punches.

Recent developments have shown the advantage of not using cards, but rather a reusable media such as tape or disks. This has the advantage of eliminating the cost of the actual card, but the disadvantage of having to upgrade technical details substantially. A Mohawk data recorder using these techniques requires maintenance from a totally different type of engineer than does an IBM keypunch.

Reducing Costs

In order to keep things economical, some firms have looked at the problem to see if perhaps some of the equipment is being unnecessarily duplicated. If the electronics can be shared between two or more girls, substantial savings could be made. Following this philosophy, it turns out that mini computers have an essential role, even though they were not used previously!

Each data entry station becomes a remote terminal which is polled frequently by a mini computer. The girls can be working at their maximum speeds but the system is working in microseconds, so it is safe to have a polling technique to check each girl in turn and pick up every character that she has entered. There is no limitation on a girl's input.

The mini computer can then channel these inputs and put the necessary labels on them so that each fits into a tape or disk drive.

The role of the mini computer is plain. Without it, it would not be possible to bring the expensive expertise of this decade to a single desk economically. With it, it is not only simple but vital. The mini computer is so powerful that it can handle the job with time to spare, and people are beginning to look for additional applications.

When a piece of equipment breaks down more frequently than another, someone must talk to a serviceman. Without the ability of the computer to log these situations, it is a matter of saying, "I think," but with the computer, it is a matter of saying "it was down" so much time more than any of the other systems.

Similarly, if an operator's error rate is more than expected, the computer can monitor this and bring it to management's attention.

But, it can do more than just bring these things to management's attention. Anyone remembering the unpopularity of work-study personnel in the factories earlier in this century can understand the problem. The mini computer also has the capability of helping the operator. It will take note of the mistakes that are being made and then analyze them to find out what the pattern is and search out a reason for the error — hopefully eliminating the problem by this analysis.

With this in mind, it can be expected that data entry operators will, with the aid of a mini computer, reach a higher degree of professionalism very quickly. The department will be more productive, and the company will be able to afford better equipment.

Analogous Example

There are, to our knowledge, no applications that have advanced to this point as yet, but there are computer systems servicing the real estate industry throughout the country. These systems maintain a data bank of all available property and quickly match a potential buyer. If the buyer does not like the listing, another can be found — to show four bedrooms instead of three, a livingroom with fireplace, etc.

The system has had interesting results with regard to the professionalism of the salesman. It has made his time more productive. Instead of having to spend time searching for houses to fit the requirements of prospective buyers, he can check with the computer. He saves time and annoyance when, inevitably, the buyer adds more and more restrictions to his wishes as he sees houses.

The fact is that the salesman sells more houses per unit time and therefore, a more professional person can afford to be engaged in this work.

Minis Can Do It

Mini computers have the same capability for the future. They will have time available from dedicated tasks and, if used properly, it may turn out that the changes that have come about as a result of the big computers will be equalled by those resulting from the widespread use of mini computers.

Effects of a Peripheral Change

One of the places where the effects of an environment can be seen is in automated schoolrooms. While the economics of the situation are still causing trouble, the effects of peripherals and the feasibility of programming teaching is shown by this Hewlett-Packard 2007 system. It comes equipped with an optical reader — eliminating the need for punched cards — and allows class members to learn programming simultaneously without long waits for material from the keypunch facility.

Offices May Go On-line When Communications Match Minis

It is not inconceivable that within the next 10 years, the majority of small businesses in the U.S. will have direct contact with small computers, whether through a remote batch terminal located in their own offices or through a "Data Concentrator" talking over a standard telephone line with a teletypewriter located in his office.

Certainly communication is going to be one of the largest markets for the small computer. They are presently being used as: data concentrators (communicating with a large number of teletypewriter lines in a local area, and concentrating data for high-speed telephone lines to central large computers); as line multiplexors for large computers; as a computer receiving written text and controlling typesetting machinery; and as remote batch terminals located throughout the United States controlling peripheral devices and connected, through telephone lines, to a large central computer.

As the price reduces, and the key software becomes available, as it is doing, new markets are developing which will keep the small computer industry growing at a rapid rate. Varian Data Machines' "Data Concentrator" package is an example of this; the package consists of complete hardware and software to put the customer on-line.

VICE PRESIDENT

To head up newly formed Boston division of small publicly owned company rapidly expanding in proprietary commercial and industrial data processing hardware systems utilizing general purpose miniature computers. Background of successful accomplishment in directing computer oriented system hardware and peripherals. Top level compensation with bonus plan based on profit performance plus unique opportunity to acquire call on substantial equity.

OTHER KEY POSITIONS: Senior Logic Design and Memory System Engineers. Also PROGRAMMER with extended experience in system applications and programming on small computers. These key positions have similar benefits and capital gains opportunities.

Box No. 3043

Mini Meets Furniture Designer

One disadvantage in having a small computer is that if you are not careful you may lose it. If you have an interior designer able to cope with the task, you may turn size into a marketing advantage, as happened with the above Nova system. Nova recently announced an increase in deliveries to reduce a backlog of over 400 systems.

When New Meets Old

Mini computers are really mini. This photo shows the difference in size between the original PDP-1 — the first computer put out by Digital Equipment Corp. — and one of its most recent systems, the PDP-8/L.

Reliability a User Concern Not Just That of Supplier

One of the most important characteristics in the use of mini computers is to provide ample reliability, or, alternatively, other methods of handling work when a system goes down. Both the user and the manufacturer have to plan ahead.

One approach to providing reliability in a system is exemplified by the type of on-line diagnostics used in some Raytheon computers. Raytheon says that its disgnostics are so quick that they can run during a coffee break.

The routines work through the operations of the hardware and exercise various circuits so as to pinpoint what components need replacement. The spare parts are kept with the system, generally in the console drawers, and user personnel can easily install them to get the system back in operation. This diagnostic feature has been a major marketing tool and may well be adapted by others.

Unusually High Reliability

High reliability, or rather unusually high reliability, is a different technique that provides for service operations located more than one hour away. One of the highest recorded so far involved a Bailey 756 digital computer which was reported in March to have been checked out at 99.996T availability for a full six-month period at the Kyushu Electric Power Co. During the performance test period there was not one shutdown that could be attributed to computer operation. Simple malfunctions within the computer itself were rectified within an average of two to three minutes.

The 756 computer accepts 250 analog and 103 digital inputs, executes performance calculations, and provides readout of alarms, trends, logs, and reviews of operation. The system controls a combustion boiler with a maximum capacity of 490 tons of steam per hour.

These are two approaches to guaranteed reliability, but there will be others. Some of them will call for replaceable components very much like Raytheon's, but checked out by the local TV man. Others can be expected to use ITT Federal Services, or GE's support facilities. These services are spread over the country and can be hired on a contract basis.

The real problem, however, is downtime, not repair time and the time lost in getting a serviceman. GE, for instance, averages four hours on its service, but it can be as much as eight hours. This is eight *working* hours. A system that goes down Wednesday at noon may not be inspected before Thursday at noon. A user must be aware of this problem and plan for it.

In mainline computer planning, downtime has been regarded as a nuisance. A certain volume has been planned for, but the number of actual incidents is rarely taken into account. Not all the 168 hours in the week can be scheduled for production. This is practical when support can be had within an hour, but may not be practical for the mini-market.

A SMALL COMPUTER WITHOUT GOOD SOFTWARE IS A MINI MONSTER

Programming small computers is a very specialized art, because simple machines happen to require sophisticated programs. It doesn't take long to discover just how complex things can really become.

Agrippa-Ord specializes in techniques which efficiently generate large programs for small computers. If you have a small computer and a large problem we can help you get positive results. Give us a call or write to:

AGRIPPA-ORD CORPORATION

MONUMENT SQUARE CARLISLE, MASSACHUSETTS 01741
TEL. (617) 369-2912

Make 4K do 32K jobs?

ICS knows how!

We're the people who developed 4K FORTRAN and ALICS II assembler for the PDP-8. Our real-time systems, built around mini-computers, are recognized models of efficiency and economy. Our software is an integral part of more than 50 control systems in use around the world. We do languages and systems in 4 and 8K that others swear require 32K. Challenge us!

Take another look at those plans to spend *big* for 32K of core to do your job. 4K in our hands could be all you need . . . and that could cut your cost fantastically. This isn't a speculation, it's based on past accomplishment. ICS has developed text editing for automatic typing using the PDP-8L—the "other" system uses a 360; we've created difficult real-time process controls using the PDP-8 and 9 series; and we've done key work for both U.S. and international makers of minis. When you contact us we can supply you the names of big and small companies across the nation for whom we've done systems.

After you've looked again at your big computer plans think small and contact us at ICS.

Information Control Systems, Inc.
119 East Madison Avenue • Ann Arbor, Michigan 48104
Offices in principal cities.

"O K ICS, you're on. Show us!"

Information Control Systems, Inc.
119 East Madison Avenue • Ann Arbor, Michigan 48104

Here is our area of interest:

☐ 4K BOSS (Business Oriented Software System) ☐ 4K FORTRAN
☐ 4K ALICS II Assembler ☐ Systems Design Assistance ☐ Custom Software

Name_____

Company_____

Address_____

City_____ State_____ Zip_____

P.S. If your need is more urgent, telephone us (313) 761-1600

...when Commonwealth can cut them in half?

We know what you're thinking: (It may cost me a lot more to do my programs inside, but I'm better off.) Applesauce, we say. The high turnover today alone means that people don't stay around to finish projects. So where's the continuity?

Now . . . wouldn't it be great to have all your programming in apple-pie order all the time — for just a call or a coupon?

Believe us. We're really that good.

Send in the coupon or call us at (617) 891-6725.

Frankly, if you can do all my 360 programs for half the money I'm peeling off for them now, I want to know more.

Name _____

Title _____

Company _____

Street _____ City _____

State _____ Zip _____ Phone _____

Send to: Mr. Lee Rankin
Corporate Headquarters
Commonwealth Computing Inc.
60 Hickory Drive
Waltham, Massachusetts 02154

Commonwealth Computing Inc.

BOSTON NEW YORK PHILADELPHIA BALTIMORE WASHINGTON D.C.

COMPUTERWORLD

software

Remote Batch Available Now for SDS Sigma 5,7

By a CW Staff Writer

LOS ANGELES – A remote batch processing capability, which enables users at remote sites to use a remote central computer to process their batch jobs, was announced here recently by Scientific Data Systems. The package is an extension of the Batch Time Sharing Monitor (BTM) and Batch Processing Monitor (BPM), is designed for use with the Sigma 5 and 7 series of computers using the Model 7670 remote batch terminals.

The 7670 terminal combines a 200 card-per-minute reader; a 75 card-per-minute punch; a 128-column, 250 line-per-minute bar printer; an operator's control panel; and a central control unit.

The company feels that RBP is ideal for use as part of any company's in-house computing capability, particularly where batched scientific and commercial jobs submitted from remote sites must be processed through a large, central computer.

Extensive Error Checking

The software provides for extensive error checking for both commands and operating functions. Recovery procedures are automatic, combining printed verification and response to all such errors.

All languages and subsystems of the SDS BTM and BPM are available under the remote batch system.

The terminal leases for $810 a month, with deliveries beginning the second quarter of this year. The software is provided free to all users of the company's computers and will also be available under BPM or BTM the second quarter of the year.

Testpak Application Program Test Package Announced For RCA 70

LOS ANGELES – A new version of the Testpak series of automated application program testing packages has been announced for the RCA Spectra 70 computers. The customer can evaluate the system free of charge on his own machine.

The new version further expands the line which now includes the System 360 DOS and OS version, from Computer Methods Corp.

The company claims that the package can eliminate 50% of the required programming test time needed to implement a program. Other than computer time reductions, the benefits include: job-stream testing, shorter turnaround time between runs, no operator intervention, selection of representative test data, creation of test data files, automatic test-run documentation, and the elimination of testing with live files.

According to N. Louis Senensieb, vice-president for the company's western division, "The Testpak series has proven out to such predictable savings that the company will install the package on the client's system for evaluation free of charge."

The company has offices at 1633 Westwood Blvd. here and 866 Third Ave., New York City.

'Peac' Schedules Plaza Construction

PASADENA, Calif. – Peac, a proprietary software package from Economatics, will be used to aid construction of the twin-tower Atlantic Richfield Plaza. The contract came from project engineers David H. Workman and Associates.

Peac (Program establishment and control) is designed to replace the Pert/Cost technique of project management and planning. The engineering firm said it considered Peac to be far more comprehensive and to require less effort to implement. It is currently available with any third generation computer, according to Economatics.

Because Peac can do a limited form of probability analysis by testing different alternatives, the system can handle the uncertainties inherent in the construction environment. Because Peac can simulate projects and alternative courses of action and offer on-line predictions, it will be used to forecast meaningful schedules and costs, based on a detailed analysis of the technique by the engineering firm.

The package will be used to monitor the progress of the construction and reforecast schedules and costs when slippage occurs. The contract is scheduled to run two years, the projected period needed to build the plaza.

THE PRO'S YOU NEED READ
COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY
SIXTY AUSTIN STREET, NEWTON, MASSACHUSETTS • 02160 • TELEPHONE: (617) 332-5606

Margen Report Program Is Used During 360 Conversion

CINCINNATI, Ohio – A report generation and file management system which runs on the System 360 with 65K under DOS or OS is available from Randolph Data Systems.

The system, called Margen (Management report generator), can provide several capabilities for generalized reports and file manipulation, including: report generation, file creation, file updating, and file editing. In a single program run, any combination of the functions may be performed on files which reside on tape, disk, or cards. Output reports may be either printed directly, or spooled onto a tape or disk for later printing.

Detail Capabilities

The report generator provides the ability to "build" a report by preparing a model of the report as it should look when printed, and specifying certain control information, such as total-break fields, conditional tests, and report sequencing. The form provided allows up to eight total-break levels and record-select conditions while the rest of the layout consists mainly of positioning and control information (headings, etc.).

The file maintenance functions include the creation, updating, and editing of files through the use of special input formats. Files are matched through transactions and details, providing complete sequence control for record insertion and deletion. The formats provided for coding are adequate, allowing most of the desired features to be used with no effort. Learning time is minimal, according to the company, and nonprogrammers can learn to use it in a day or two.

Computerworld contacted one of the users who has had Margen for some time, starting with a 1401 version and converting to 360.

The DP manager said, "We have been able, with the aid of Margen, to convert all but one of our existing programs to the 360 within one year." The conversion consisted of a direct jump from the 1401 into full OS on a Model 40. "Within its capabilities, it is an exceptional language," he said. "At its current $10,000 price, it is a tremendous bargain!"

He is writing all the peripheral-function systems with this language, such as general ledger, inventory, and payroll. The central functions which use the complex masterfile generated for the company's marketing studies are written directly in Cobol and assembly language.

Very Little Training

"Nontechnical people can learn to use the report functions of Margen in about two days, consisting of one-half day training and one and one-half days of orientation into the basics of computers," the manager said. "They begin doing their own report programs immediately."

The only problem his company has faced with Margen is that of project control with the nontechnical people. There are no effective controls on the programs they submit, and no establishment of priorities.

He also pointed out that there are features in the language to permit the I/O to be handled through an exit routine, something which the developer neglected to mention in its documentation.

Randolph Data Services has offices at 1425 E. McMillen St. here.

Two Companies Combine To Produce Simulators

By a CW Staff Writer

BRAINTREE, Mass. – Interactive Sciences Corp. here and Digital Systems Corp. of Hanover, N.H., have agreed to begin a cooperative effort in the development, application, marketing, and maintenance of advanced simulation processors to serve the industrial and government markets, according to Thomas M. Nourse, general manager for ISC.

One such proprietary product, Pacer (Process assembly case evaluation routine), is described by Dr. Paul T. Shannon, president of DSC, as the systematic computer encoding of chemical engineering knowledge to enable chemical process engineers to simulate, design, and optimize complete chemical plants.

The professional version of Pacer has an extensive library of unit computations and physical properties plus many of the other related factors which have been defined as a result of actual industrial use. A simplified version of Pacer is available for colleges and universities and is actually in use in some 25 institutions, according to the company.

Nourse explained that Pacer and other similar proprietary packages for other industries will be available both for adaptation for customers in-house and through ISC's regional time-sharing service using the PDP/10 computer.

The marketing and field support activities will be done through ISC, and the high-level consultation and development will be done through DSC. The first commercially operational ISC center will be open this spring. ISC is located at 170 Forbes Rd. here.

SUBSCRIBE TO COMPUTERWORLD

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY
SIXTY AUSTIN STREET, NEWTON, MASSACHUSETTS • 02160 • TELEPHONE: (617) 332-5606

Yes, please send me COMPUTERWORLD for . . .

☐ 1 Year $ 9.00
☐ 2 Years $16.00 ☐ Bill Me
☐ 3 Years $20.00 ☐ Payment Enclosed

AA

Name
Your Title (49)
Co. Name (57 … 79)
Address (15 … 37)
City (38 … 51)
Zip Code (2 … 6, 7 8 C W, 15 16, 17 18 19 20 21 22 23 24 25 26 27)

Return to:
COMPUTERWORLD 60 Austin Street, Newton, Mass. 02160

Please Circle 1 Number and 1 Letter:

YOUR TITLE AND/OR FUNCTION?

A. Operational Management (nonengineering)
B. Computer Professional Staff
C. Corporate Officers
D. Engineering Management
E. Engineering/Scientific
F. Production/Maintenance
G. Sales/Marketing
H. Other _____

COMPANY BUSINESS:

1. Mining or Construction
2. Manufacturer/Computer or Data System
3. Manufacturer/Other
4. Utility
5. Wholesale/Retail
6. Finance
7. Consultants/DP Services
8. Business Service (except DP)
9. Educational/Medical/Legal
10. Government/Military
11. Other _____

SOFTWARE FOR SALE

ADVANCED MANAGEMENT SYSTEMS, INC.

Presents

AMS

DOCUMENTATION STANDARDS

A method of furnishing standardized techniques for non-machine documentation that will provide:

- *Standardization of Operation*
- *Improved Visibility for Management*
- *Improved Visibility for Personnel*
- *Improved Supervision*
- *Self Training*
- *Simplicity of Maintenance*

The Documentation Standards will be custom structured for your organization to produce unity of:

- *Proposals*
- *Design*
- *Test*
- *Conversion*
- *Operation*
- *Review*

For Full Information Call or Write

ADVANCED MANAGEMENT SYSTEMS, INC.
1833 E. 17TH STREET
SANTA ANA
CALIFORNIA 92701

---

cobol MAIN-GEN

Generate Edit Verification and File Maintenance programs in Cobol. Complete operational systems in **ONE HOUR.**

Scorpio Data Systems Inc.
Tallman Center
Tallman, New York 10952
(914 357-5845)

WHY GUESS? MEASURE!

Use SMS/360 products to determine:

- ★ Program Efficiency
- ★ Configuration Balance
- ★ I/O–Compute Ratios, etc.

Available for lease or purchase, OS or DOS.

For details, contact –

Boole & Babbage Inc. (415) 961-4440

1121 SAN ANTONIO ROAD
PALO ALTO, CALIF. 94303

Data & Information Products, Inc. representatives in:

New York	Atlanta
Chicago	Kansas City
Detroit	Philadelphia
Milwaukee	Cleveland
Dallas	

"FORFLO" IBM 1130/1800 DOCUMENTATION SYSTEM

System Consists of 2 Parts:

– Resequences FORTRAN statement numbers by fives, adjusting all branch and I/O statement numbers accordingly. Replaces constant logical unit numbers with variables for easy program conversion (user option). Punches new source deck titled and numbered in columns 73-80.

– Flowcharts any 1130/1800 FORTRAN program from source deck. Shows DO loop nesting. Draws complete flowlines. Separates input and output to allow flowcharting during off-shift time.

"FORFLO" runs on any 8K, 1130 w/disk and line printer or equivalent 1800. Runs in stacked job mode. No need to remove monitor control cards. System supported and maintained.

Send a duplicate FORTRAN deck for free demo and more information.

Price – $480

DNA SYSTEMS

DNA Systems
2415 W. Stewart Ave.
Flint, Michigan 48504
(313) 789-4402

Software & Systems Services
---Specializing in 1130/1800

360/20 – UNIVAC 9200 & 9300 GENERAL ACCOUNTING LEDGER SYSTEM

designed for 8K card system with Reader Punch and printer; Produces Journal Voucher Balancing, Trial Balance, General Ledger, Budget vs. Actual Comparison Reports and Financial Statements. Fully operational for 1 year. Send for full details. Price: Upon request.

Contact: Ron Ascherman
P.O. Box 1958
Santa Ana, Calif. 92705

---

360 COBOL (Disk/Tape)

PAYROLL/PERSONNEL SYSTEM

Series of 16-22 easy-to-maintain programs. Handles multi-company/state, hourly & salary payrolls. Unique union matrix (if required) to process unlimited union or special pay configurations. Complete file maintenance, documentation, JCL, etc. Several versions available. Contact us about references, custom modifications and detailed info. All versions $4,500.

COMM/SCI SYSTEMS CORP.
785 Market Street
San Francisco, California 94103
(415) 392-5379

INTERPRETING DISPLAY DUMP FOR IBM 360

Scans memory for instructions, CCWs, EBCDIC characters, fixed point numbers, floating point numbers, repeated bytes, and repeated words; and prints what it finds in an appropriate easily read format.

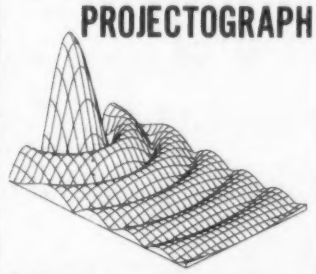
This is a clean, compact program. In most ambiguous situations it is smart enough to make the same interpretation as an experienced programmer would make.

Write for more information and a sample memory dump.

Price $160.

Superior Computer Systems
P.O. Box 2971
New York, N.Y. 10001

PROJECTOGRAPH



Software to display 3-D surfaces on your computer's plotter

- Completely operational *now*
- Operates on any computer with Fortran and any on- or off-line plotter
- Isometric/Oblique or Perspective packages – $2000
- Both packages – $3000

Call Collect: Hal Dickson
(213) 451-8778
Technology Service Corporation
225 Santa Monica Boulevard
Santa Monica, California 90401

Mr. System

A complete ENGLISH LANGUAGE RETRIEVAL SYSTEM compares to packages selling for $10,000 and up. SAVES programmer time on one-time and repetitive reports. If you're rewriting or converting programs, Mr. System will replace report generators.

COBOL—DOS—32K minimum.

Selects, Sorts, Accumulates, and Prints report to your specifications.

Installed by mail only $2500 with complete User and Programmer Manuals.

Write:
Mr. System
Information Science Incorporated
New City, Rockland County, N.Y. 10956

Selective Information Retrieval System

A new computer program that allows you to –

* Select records from any sequential tape or sequential disk file
* Save specific information from the records selected
* Use any condition of selection
* Begin fields used in conditions of selection in any byte of a record
* Use up to fifty "AND"/"OR" conditions in selecting any class of record

Designed for S/360, DOS, 32K and up. Send for full details.

PRICE: Upon Request

Contact: L.H. Baker
Pioneer Data Systems
1206 Mulberry Street
Des Moines, Iowa 50308

NOTICE

In order to insure prompt consideration of your communications with COMPUTERWORLD, please specify:

CIRCULATION DEPARTMENT,

EDITORIAL DEPARTMENT,

or

ADVERTISING DEPARTMENT
COMPUTERWORLD
60 Austin Street
Newton, Massachusetts 02160

COBOL USERS

DETOC

- **INCREASES PRODUCTION**
- **REDUCES COSTS**
- **IMPROVES SYSTEM EFFECTIVENESS**

Use DETCO PROCESSOR with decision tables to cut designing, programming, debugging, and maintenance time.

DETOC, ISL's new Decision Table to COBOL Processor, is available now through our complete leasing program that includes ongoing maintenance, training and retrofitting of improvements. For more data, call collect or write:

Howard Conrad

INFORMATION SYSTEMS LEASING CORP.
THE PLAZA
JENKINTOWN, PA
19046
PHONE: 215/885-2540

REDUCE THE COST OF COBOL PROGRAMMING

The "SYSCOM COBOL DOCUMENTATION SYSTEM" exploits the documentation capabilities of COBOL.

- ATTACKS THE REAL PROBLEM–THE SOURCE LANGUAGE.

  Generates sequentially related paragraph names.

  Can change data element mnemonics to descriptive data element names or generate sequential, record related descriptive names.

  Produces paragraph name cross reference.

  Produces data element cross reference.

- LESS EXPENSIVE TO PURCHASE AND USE THAN FLOW CHARTING SYSTEMS.
- CHANGES TO THE PROGRAM ARE FASTER TO IMPLEMENT SINCE THE DOCUMENTATION AND PROGRAM LISTING ARE ONE IN THE SAME.

For more information please contact

SYSCOM
A Division of
Republic Corporation
2409 Sepulveda Boulevard
Manhattan Beach, California 90266
(213) 372-2181

SPEED PROGRAM PRODUCTION *WITH*

BOCOL

The New, Simplified Computer Language that Solves Programming Problems

Program production bogged down? BOCOL (Basic Operating Consumer Oriented Language) speeds production by solving many of your programming problems.

BOCOL is simple and streamlined – to get you from program creation to program production faster.

NOVICE programmers can write BOCOL statements immediately.

BOCOL's clear and precise statements relieve experienced programmers of routine jobs.

BOCOL is a true one-pass compile and process language. It requires far less keypunching time, no excessive computer time for assembling and compiling.

BOCOL saves time, saves money, simplifies operations. We'll show you how it takes the pressure out of being busy. Fill in and mail the coupon below now.

Fimaco, inc.

230 W. Washington Square
Philadelphia Pa. 19106
Phone: 215/923-1936

2 Penn. Plaza, Suite 1500
New York, N.Y. 10001
Phone: 212/565-3374

FIMACO, INC., 230 W. Wash. Sq., Phila., Pa. 19106
Please send me a BOCOL Brochure.
I am using _____(mfg) computers.

NAME _____
TITLE _____
COMPANY _____
ADDRESS _____
CITY _____
STATE/ZIP _____

Product Software . . .
by Management Science Systems

Project Return Evaluation Program

PREP 600

A management decision-making tool for computing return on investment and evaluating the economics of capital investment projects under conditions of uncertain revenues and costs . . . developed jointly by Management Science Systems and Chem Systems, Inc. Available now for the IBM System 360.

PREP computes any of three return indices:

- **Discounted Cash Flow**
- **Years to Payout**
- **Present Worth Ratio**

Output also includes:

- **Cash Flow Profiles, Absolute and Discounted**
- **Cash Flow Buildup**
- **Summary Display of Project Economics**
- **Results of Sensitivity Analysis on Selected Economic Factors**

Lease price includes installation, training seminar, and complete user documentation.

For further information about PREP and other Product Software available soon, contact:

MR. DAVID S. HIRSHFELD
Vice-President,
Management Sciences

MANAGEMENT SCIENCE SYSTEMS
1530 East Jefferson St.
Rockville, Md. 20852
(301) 427-1840

SOFTWARE FOR SALE

CAPITAL ASSETS

ACCOUNTING

Fully documented 15 program COBOL system with installation support to $4000. Write:

NATIONAL
SYSTEMS PLANNING, Inc.
3166 Maple Drive
Atlanta, Georgia 30305
(404)233-1601

---

360 Payroll System
– 100% COBOL –

Series of 23 programs which process hourly and salaried payrolls in a multi-company environment. Liberal deduction capabilities. Full labor distribution reporting. Complete file maintenance facilities. Excellent documentation. Runs on IBM 360 with 32K and two 2311 Disk Drives. This system is now being used and has proven highly successful.

PRICE: $5,000.

Levin-Townsend Service Corporation
One Decker Square
Bala Cynwyd, Pa. 19004

NEW RATES
SOFTWARE FOR SALE

7 col. inch	$63.00
6 col. inch	$56.00
5 col. inch	$49.00
4 col. inch	$42.00
3 col. inch	$35.00
2 col. inch	$28.00
1 col. inch	$14.00

Minimum run at these rates 13 weeks (prepaid).

PROMPT

Program Monitoring and Planning Techniques

A highly-responsive project control package which furnishes detailed reports to multiple-levels of management to optimize decision-making and operations. PROMPT can reduce expensive cost, manpower and schedule overruns since it can accurately pinpoint these problems sufficiently in advance to enable rapid correction.

PROMPT provides:

- Detailed analyses of work performance
- Variance data from original estimates
- Summarized project analyses
- Detailing of staff utilization
- Analysis of overhead accounts
- Historical statistical tabulations of overall project and individual performance

Write or call: R. Dickinson

ARIES CORPORATION
Products Division
Westgate Research Park
McLean, Virginia 22101
Phone: (703) 893-4400

AUTOFLOW

An automatic flowcharting system that produces 2 dimensional flowcharts directly from Cobol, Fortran, PL-1, and assembly language input.

Autoflow also produces listings of syntax errors, logic errors, data-name cross reference, label (or paragraph or statement number) cross reference index, and alphanumeric label index. Available for: IBM 360 systems, H-200 systems, Spectra 70 systems, IBM 1400 and 7090 systems. Write for literature and free demonstration.

PRICE: Upon request

Contact: Applied Data Research
Route 206 Center
Princeton, N.J. 08540

Rapid Access Management Information System

RAMIS retrieves information, manages files, generates reports *automatically* on your 360 OS.

Call: (301) 656-2870

MATHEMATICA

4905 Del Ray Avenue
Bethesda, Md. 20014

QUERY

- Immediate Access to Information
- Searches & Retrieves Fixed & Variable Data
- File Format Independent
- No modification to your files

OPTIONS:

Reformat, Tally and Sum
30-Day Free Trial

AUTO-LEX

- Thesaurus File Generator
- Thesaurus File Maintenance
- Add New Terms
- Delete Old Terms
- Alter Term Relationships

OPTIONS:

Hierarchical, Permuted, Photo-Composition Insert Preparation
30-Day Free Trial

INTERRUPT ANALYZER DOS/TOS

Over 30 Sold to Major Users

- Increases Programmer Productivity
- Saves Production Jobs
- Stops premature cancellation of computer runs caused by program or data bugs.
- Analyze will display or alter instructions and data, take memory dumps, etc., from console typewriter.

Price $75.00
Write or Call

COMPUTER RESOURCES CORPORATION
6825 Redmond Drive
McLean, Virginia 22101
(703) 356-5100

SCORE™
Information Retrieval & Reporting System

Last year 25 major users ordered it, are using it, are happy with it.

Seminars:

March 26-Phila., Pa.
April 11, Washington, D.C.

For details contact
Robert P. Wolk at
215 WA 5-8424

AtlanticSoftware
Software Marketing Specialists
Lafayette Building, 5th & Chestnut Sts
Philadelphia, Pa. 19106

Are your information management programs tying your computer up and your programmers down? Untie both with . . .

GIM*

GENERALIZED INFORMATION MANAGEMENT SYSTEM

GIM enables you to:

Significantly cut programming time to get an information management system on the air.

Deal with one integrated program rather than a series of many interdependent programs.

Establish data bases consisting of highly interrelated but different files.

Query your data base in English.

GIM is machine independent. It can be used on any computer that meets small core and random access storage requirements. Your data management personnel can learn to use GIM effectively themselves within two weeks, without knowledge of programming or computers.

GIM is available now! Inquire today about our leasing plans. Write Roger Wise, TRW Systems Group, One Space Park, Redondo Beach, Calif. 90278.

TRW

*GIM © Copyright TRW INC.

IBM CCAP

binary synchronous support

Multipoint Leased Line
360/360
360/2780
Headers and Text
Up to 4800 Baud
BSC Error Overlay
EBCDIC or USASCII Codes
Transparency
Integration Assistance

contact
Mr. Warner Sharkey
(302) 762-5605

ITC
International Telecontrol Corporation
4300 Pine St.
Wilmington, Del. 19802

DPS/DOS →

Moving Up?

Convert your DPS-ALC Source Language Programs Automatically to DOS, using DOS. All features converted, including Overlays, Direct Addressing, and Binary Card File Input.

Send your non-returnable Source Program for a Sample Conversion and pricing details.

GLOWCO

GLOWCO SYSTEMS
Box 674
Bensenville, Ill. 60106

SOFTWARE WANTED

EARN WITH YOUR SOFTWARE!
THE ORIGINATORS OF **READYSYS III**

NEED ADDITIONAL EFFICIENT 3RD GENERATION SOFT. WARE TO COMPLIMENT EXISTING PROGRAM LIBRARY

STERLING COMPUTER SYSTEMS, INC.

Quick Reference System Is Based On Computer, Video Type Setting

NEW YORK – Using computerized methods and video type composition, Trans World Airlines has developed a new "quick reference" worldwide system timetable.

"Passengers in Albuquerque or Zurich should find our new timetable much easier to read than previous timetables which show eastbound and westbound schedules in tabular form with arrows and small type," said John T. Logan, TWA staff vice president for scheduling.

Similar to the compact, quick-way schedule system in effect city-by-city throughout the TWA network for several years, the new "quick reference jet schedules" tell a passenger at a glance, for example, that from Albuquerque to Amarillo there are three non-stop flights daily.

Ferguson Wins Litigation Fight

LOS ANGELES – After nearly six years of litigation, David E. Ferguson, president of Programmatics Inc., has won his suit against Computer Sciences Corp., while CSC lost its action against Ferguson.

It all began when CSC gave Ferguson a $10,000 secret bonus agreement and later attempted to recover $6000 paid under that agreement. Ferguson counter-sued for unpaid vacation pay and profit sharing, which he contended was owed to him.

Ferguson won on both counts, while CSC lost in Superior Court, Los Angeles County in February 1967. CSC, after losing an appeal in the District Court of Appeals, finally requested a hearing in the California Supreme Court, which now has been denied.

READYSYS III

THE MULTIAPPLICATION SYSTEM

Enable your 3rd generation facility to operate with optimum efficiency. Others offer payroll or job cost or billing or inventory or.....The 1200 3rd generation programs that make up READYSYS III allow processing to occur on varied applications within the same software package.

STERLING COMPUTER SYSTEMS, INC.

WRITE
DEPT. M-1, 3305 MONTROSE BOULEVARD, HOUSTON, TEXAS 77006

---

3 DAY PROGRAMMING SERVICE?
3 DAY PROGRAMMING SERVICE!

Year-end pressure? Last-minute requests? Quarterly and annual jobs not yet programmed?

We will deliver the output within 3 days of receiving your specifications. We say 3 days, we mean 3 days. The cost will be no higher than you pay for far slower, conventional programming assistance.

Call 212-751-5280 today for details on a fundamental breakthrough in programming that brings software out of the stone age.

MNEMOTECH COMPUTER SYSTEMS, INC.
685 Fifth Avenue, New York, N.Y. 10022 • 212-751-5280

Signing the Carterfone acquisition agreement is David S. Francis, president of Data Communications Systems, Inc., with Thomas F. Carter, president of Carterfone Communications Corp.

Data Communications Firm Absorbs Carterfone Corp.

MINNEAPOLIS – Data Communications Systems, Inc. has acquired Carterfone Communications Corp. for an undisclosed amount of common stock.

A joint announcement of the completion of the acquisition was made by Thomas F. Carter, president of Carterfone and David S. Francis, president of Data Communications.

Carter will become chairman of the board of Data Communications.

Carterfone Communications manufactures the Carterfone Voice Coupler, an electronic device that links the private two-way radio system to the public telephone system.

Such a link was heretofore illegal because of existing AT&T tariffs. Those tariffs, however, were recently ruled unreasonable and unlawful by the FCC.

Data Communications Systems manufactures data transmission equipment which links computer terminals into the telephone network.

Control Data Agrees to Sell Out $10 Million Worth of Grabler Mfg.

By a CW Staff Writer

TIFFIN, Ohio – Control Data has taken another step in its apparent plan to integrate its Commercial Credit Co. subsidiary with CDC's overall concentration on data processing equipment, services, and financial activities.

CDC has agreed in principle to sell assets of the Grabler Mfg. Co., valued at over $10 million to Hayes-Albion Corp., an auto parts supplier.

Grabler is presently owned by Commercial Credit Co., a CDC subsidiary.

Hayes-Ablion has indicated that the assets, including land, plant, and basic equipment, have a book value of over $10 million, but neither firm has yet disclosed the agreed sale price.

The plant, built in 1967, will be converted from the present manufacture of pipe fittings to malleable iron castings for the transportation industry such as used in disc brakes, differential carriers, and other parts.

All production at the plant has been halted while the equipment is moved for the new owners, and the foundry will lay-off about half of the 780 employees during the process.

Greyhound Pays $6 Million in Cash For British Data Service Company

By a CW Staff Writer

CHICAGO – Greyhound Computer Corp. has completed the acquisition of Management Dynamics Ltd. for $6 million in cash, according to company officials.

Final approvals for the acquisition of the London-based computer service company have been received, including the required consent of the British government, said James S. Campbell, president of Greyhound Computer.

Management Dynamics employs 770 persons in computer service centers, data preparation, management consulting, and data processing personnel placement.

Campbell also said that John Brown, Management Dynamics founder, was elected chairman of Greyhound Computer Services Ltd.

Canadian Railroad Attempt At CSC Combination Checked

OTTAWA – The attempt by two Canadian railroads to acquire Computer Sciences Canada, Ltd., a subsidiary of Computer Sciences Corp., Los Angeles, is rolling into Canadian governmental problems.

Postmaster General Eric Kierans said in Commons that officials in the newly organized Communications Dept. are "assessing the implications" of the purchase by the Canadian Pacific Railways and the Canadian National Railway.

The take-over also would be referred to the Combines Investigation Branch, stated Ron Basford, Minister of Consumer and Corporate Affairs.

Under the new arrangement, Canadian National and Canadian Pacific each has purchased 25.5%, or 51% of the total outstanding shares of Computer Sciences Canada. The transaction involved an undisclosed amount of cash.

Canadian National and Canadian Pacific operate an extensive network of telecommunications services throughout Canada, including joint operation of a broadband exchange service which provides voice communication and high-speed data transmission.

Computer Sciences Canada began operations in August, 1967, providing the same services offered by the parent Computer Sciences Corp. in the United States. The Canadian company has offices in Ottawa, Toronto, Calgary, and Vancouver.

Computer Sciences Corp. will retain a 49% interest in its Canadian subsidiary.

Computer Sciences Canada has plans to provide a time-sharing service for business organizations. Under this program, Canadian National and Canadian Pacific Telex subscribers will be linked via communications circuits to high-capacity computers in centers across Canada.

Levin-Townsend Agrees to Buy Las Vegas Hotel

NEW YORK – Levin-Townsend Computer Corp. has announced it has agreed to pay $10 million in cash for an out-of-business hotel and casino in Las Vegas.

Howard Levin, president of Levin-Townsend, said he expects the acquisition of the Bonanza Hotel and Casino to add at least $1 million a year to earnings.

In addition, the purchase is also expected to carry a $3 million tax-loss credit, he said.

The Bonanza Casino was closed in 1967 after having lost over $3.5 million during a three-month period.

Levin-Townsend already owns a country club and golf course in the area, and Levin said that the purchase of the Bonanza should help form "the foundation of a substantial Nevada operation."

The company has also acquired 17 acres of "prime land" in the transaction, and plans to build an 800-room high-rise addition to the Bonanza with a preliminary estimate of construction costs at about $12 million.

In a development several weeks ago, Levin-Townsend Computer's planned offering of $35 million of 20-year debentures ran into unfavorable stock market conditions which caused the offering to be postponed pending improved market conditions.

The proceeds of the offering would have been used to retire short-term debt, and for further purchases of computers and possible acquisitions.

Optical Scanning Applies To Amex, May Need Split

BOSTON – Optical Scanning Co. has applied for listing on the American Stock Exchange says John W. Busby, president.

Busby qualified his statement by saying that Optical Scanning may have to split its stock to be listed.

Optical Scanning, traded over the counter, has 522,000 shares outstanding; 168,000, or 32%, of which are owned by American Research & Development Corp.

Busby, in addition, owns 47,000 shares, and enough other stock is held by company-associated people so that round lots in public hands are below the exchange's roundlot listing requirements.

Busby admitted that the question of a split has been discussed by directors, but he didn't give any indication of what the ratio might be.

Hudson Files Application For American Listing

NEW YORK – Hudson Leasing Corp. has filed a formal application for listing on the American Stock Exchange.

Jay B. Langner, president, said, "barring unforeseen delays, we anticipate that trading in our company's stock on the Exchange will begin sometime in early April."

Hudson Leasing is a holding company engaged in equipment leasing to a variety of industries including railroad, airline, shoe manufacturing, and computing.

SSI Computer Warrants Get Earlier Transfer Date

SAN FRANCISCO – SSI Computer Corp. has announced that the SSI Computer Corp. common stock, warrants, and debentures offered in the form of 15,000 units on Jan. 22, 1969, became separately transferrable after the close of business on March 7, 1969. At the time of the offering, the transfer date was May 1, 1969, unless an earlier date was subsequently designated.

Each unit consists of seven shares of common stock, a warrant to purchase 20 shares of common stock, and $1000 principal amount of debentures.

The warrants entitle holders to purchase common stock at a price of $29 a share through Jan. 15, 1979.

$1.3 Million Committed By Two Bank Loans

WASHINGTON, D.C. – Computer Systems Development Corp., a computer leasing company, announced on Feb. 17 that it had received a loan commitment of over $1.3 million from the Security Bank of Washington with a participation by the Chemical Bank of New York Trust Co.

Steven E. Bollt, president, said the loan will be used to finance the purchase of two SDS 940 time-sharing computer systems for lease to Com-Share, Inc.

Synergistics Completes Private Placement

WALTHAM, Mass. – Completion of a private placement of more than $1 million in securities for Synergistics, Inc., was announced recently by William M. Tetrick, president of Synergistics.

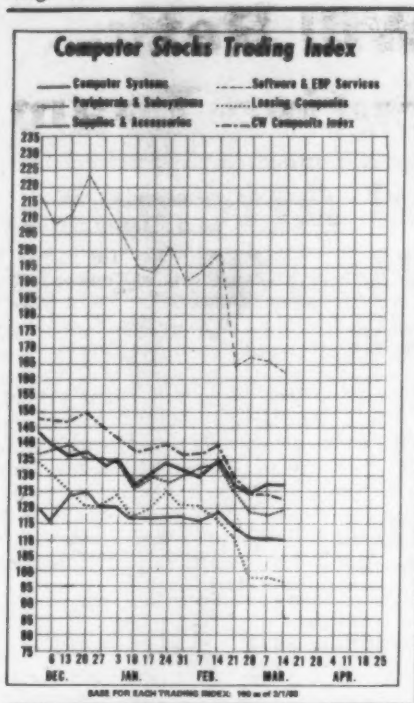
Among the group of ten investment companies which arranged for the funding is Steadman Science & Growth Fund. Purpose of the placement was to provide Synergistics with the capacity of expanding its subsidiaries in the data processing field.

SSI's Credit Agreement Increased by $105 Million

SAN FRANCISCO – SSI Computer Corp. announced on March 3 that it has completed negotiations with the Bank of America to increase its credit agreement by $40 million to $145 million. Bank of America, as agent, has issued participation in the credit to 29 other banks.

Additionally, SSI has completed an agreement with the Bank of Montreal for a senior line of credit amounting to $7.5 million. SSI will use the credit line to extend its computer leasing operations in Canada.

Total credit available from the two agreements, together with other resources available to the company, would make the total amount of computer equipment which could be purchased in excess of $200,000,000.



BASE FOR EACH TRADING INDEX: 100 as of 3/1/68

Software Drops 2.4%, Composite Falls Slightly

By V.J. Farmer
CW Staff Writer

Stocks continued a general decline during the week ended March 14 as four of *Computerworld*'s five sector indexes went down.

The Peripherals & Subsystems sector showed the only gain with an increase of 1.18 (0.99%) to 119.41.

Software & EDP Services, the largest loser, dropped 3.98 (2.39%) to 162.85. Leasing followed with a decline of 1.28 (1.3%) to 96.70.

The two remaining indexes tried hard to hold the line and registered only small losses: Supplies & Accessories, down 0.383 (0.348%) to 109.94; and Computer Systems, down 0.16 (0.125%) to 127.75.

The composite index was off slightly 0.923 (0.742%) to 123.33.

During the same week, the Dow Jones industrial average dived 6.9 to 904.28; the NYSE composite index dropped 0.4 to 54.93; Standard and Poor's industrial average declined 0.67 to 106.69; the Amex price index fell 23 cents to $29.48; but the NQB over-the-counter industrial average rose 6.17 to 390.52.

Viatron Hits

The initial public offering of Viatron Computer Systems Corp. was gobbled up by the speculators March 12, and, on its first day of trading, dealers were quoting the shares at around $35 bid, $39 asked.

The issue price by prospectus was originally set for $15.

By March 14, however, the stock had skidded to $23 and finally finished the week at $24-25.

Viatron, in short, turned a quick profit for the "in and out" speculators in a company that so far has talked economy pricing of mini processing systems but has not as yet installed any working models.

In fact, the first systems are scheduled for shipment "in the summer of 1969." Nevertheless, Viatron obviously is going to be a company to watch closely.

Two New Amex Stocks

Two new computer-oriented stocks were admitted to the Amex during February and the first part of March: Management Data Corp., and Mite Corp.

Basically, Management Data's operations are divided into leasing, management services, and finance.

The leasing group purchases and leases third generation computers and related data processing equipment.

The management services group furnishes management and computer software services, and operates a data processing service center.

Leasing accounted for about 7% and management services for about 41% of the total revenues for the year ended Feb. 29, 1968.

Their third division, commercial and finance and consumer lending, accounted for about 52%.

The company headquarters are at 1424 Walnut St., Philadelphia, Pa. 19102.

About one-third of Mite Corp.'s 1968 sales of $11.3 million was in the design, development, production, and distribution of digital data input and output devices principally to the U.S. government for military use; they also are sold directly to the Canadian and French governments.

Mite Corporation

Mite Corp. is headquartered at 446 Blake St., New Haven, Conn. 06515.

The possibility of commercial product application in the future could put new sparkle in this company.

In any case, it often pays to keep track of the new computer-oriented companies on the Amex.

COMPUTER STOCKS TRADING SUMMARY

WEEK ENDED MARCH 14, 1969

PERIPHERALS & SUBSYSTEMS

EXCH	BASE PRICE 3-1-68	1968 RANGE	CLOSING PRICE		WEEK NET CHANGE	WEEK % CHANGE	%CHANGE FROM BASE
N	58 3/8	91- 52	66	ADDRESSOGRAPH-MULT	- 1 1/4	-1.86	13.06
O	21	52- 40	40	ALPHANUMERIC	- 4 1/2	-10.11	90.48
N	29	42- 26	35 3/4	AMPEX CORP	+ 2 5/8	7.92	23.28
O	17 1/4	27- 14	15 1/2	BOLT,BERANEK & NEW	- 1/4	-1.59	-10.14
N	13 1/2	21- 11	13 3/8	BUNKER-RAMO	- 1/4	-1.83	-.93
A	32 1/8	52- 26	31 7/8	*CALCOMP	+ 1/8	.39	-.78
O	24 1/2	31- 26	32	COGNITRONICS	+ 5	18.52	30.61
O	12	15- 13	13 5/8	COMPUTER EQUIPMENT	- 1/2	-3.54	13.54
A	15 1/4	28- 17	18 1/4	*DATA PRODUCTS CORP	- 1/4	-1.35	19.67
O	19 1/4	27- 16	18 3/4	*DIGITRONICS	- 1/4	-1.32	-2.60
O	39	67- 20	47 1/2	*ELECTRON MEMORIES	- 1/2	-1.04	21.79
O	10	11- 11	11	*FABRI-TEK	- 3/8	-3.30	10.00
O	20 5/8	58- 30	30	FARRINGTON MFG	---	----	45.45
O	12 5/8	27- 10	16 1/2	INFORMATION DIS	+ 1/2	3.13	32.00
A	16 7/8	52- 14	22 7/8	MILGO ELECTRONICS	- 7/8	-3.68	35.56
A	57 1/2	222- 58	71 1/2	*MOHAWK DATA SCI.	+ 7 1/8	11.07	24.35
O	74	93- 10	93	*OPTICAL SCANNING	+ 3	3.33	25.68
O	18	48- 22	26 1/4	PHOTON INC.	+ 3 1/2	15.38	45.83
A	25 5/8	36- 20	29 1/2	*POTTER INSTRUMENT	- 1/2	-1.67	15.12
O	48 1/4	84- 5	65	*RECOGNITION EQUIP	+ 1 1/2	2.36	61.49
A	16	29- 14	18 7/8	RIXON ELECTRONICS	- 5/8	-3.21	17.97
N	46 1/8	63- 40	41 5/8	SANDERS ASSOCIATES	- 1 1/4	-2.92	-9.76
O	47 1/8	155- 53	69	SCAN DATA	- 2	-2.82	46.81
O	40 1/8	51- 22	22	TALLY CORP.	- 5	-18.52	-45.68
N	242 1/4	328-229	257 3/4	XEROX CORP	+ 3 3/8	1.33	6.40

SOFTWARE & EDP SERVICES

EXCH	BASE PRICE 3-1-68	1968 RANGE	CLOSING PRICE		WEEK NET CHANGE	WEEK % CHANGE	%CHANGE FROM BASE
O	7 3/4	26- 7	13 1/4	ADVANCED COMP TECH	- 3/4	-5.36	76.67
O	17 3/4	36- 14	33	*APPLIED DATA RES	---	----	94.12
O	15 1/2	16- 12	12	*ARIES	- 2	-14.29	-22.58
A	47	77- 42	68	AUTOMATIC DATA PRC	+ 1 1/8	1.68	44.68
O	4	12- 10	11 1/4	AUTO SCIENCES	+ 1	9.76	181.25
O	4	23- 3	12 1/2	*BRANDON APPL SYS	- 1	-7.41	177.78
A	22 7/8	42- 16	17 1/4	COMPUTER APPL	+ 3/4	4.55	-24.59
O	5 7/8	16- 5	12 1/2	COMPUTER ENVIRON	- 1/2	-3.85	150.00
O	30 7/8	64- 24	36	COMPUTER NETWORK	- 2	-5.26	20.00
N	40	66- 31	53 3/8	*COMPUTER SCIENCES	+ 2 3/8	4.66	33.44
O	39	37- 33	36	*COMPUTER USAGE	+ 2 1/2	7.46	-7.69
A	36 1/2	93- 43	80 1/4	*COMPUTING & SOFT	+ 5 1/4	7.00	119.86
O	12 1/2	28- 5	19 1/2	DATAMATION SERVICE	+ 1 1/2	8.33	56.00
O	14 1/2	22- 10	13 1/4	DATATAB	+ 1 1/4	10.42	-8.62
O	12 1/2	18- 9	11 3/4	*DIGITEK	---	----	-6.00
A	38 3/8	51- 25	30 1/4	ELECT COMP PROG	+ 1/4	.83	-21.17
O	17 3/8	34- 16	28 3/4	*INFORMATICS	- 1/4	-1.19	18.57
O	21 3/8	28- 4	8	MATRIX CORP.	- 1	-11.11	-61.90
O	5 3/8	26- 4	12	*NAT COMP ANALYSTS	- 1 1/2	-11.11	140.00
A	31	63- 23	24 3/4	PLANNING RESEARCH	---	----	-20.16
O A	13	A 15- 6	6	PROGRAMMING & SYS	- 1	-11.11	-39.62
O	9	15- 6	6 1/4	SOFTWARE SYSTEMS	+ 1/4	4.17	-30.56
O A	29	A 44- 8	21	STRATEGIC SYS	+ 4	23.53	-28.81
O	20	22- 10	13 1/2	TBS COMP CENT INC.	---	----	-34.15
O A	12	A 12- 7	7 1/2	UNITED DATA CENTER	- 1	-11.76	-37.50
O	63	185- 5	11a	*UNIVERSITY COMP	---	----	88.95
O A	20	A 36- 20	38	URS SYSTEMS	- 2 1/2	-7.69	58.00
O A	30	A 30- 13	13 1/2	U.S. TIME-SHARING	- 1/2	-3.57	-55.00

COMPUTER SYSTEMS

EXCH	BASE PRICE 3-1-68	1968 RANGE	CLOSING PRICE		WEEK NET CHANGE	WEEK % CHANGE	%CHANGE FROM BASE
N	163 3/8	255-157	231 3/4	*BURROUGHS CORP	- 3 1/4	-1.38	41.88
N	67 3/4	101- 48	48 1/8	COLLINS RADIO	- 4 1/8	-7.89	-28.97
N	101 1/2	163-124	132 1/2	*CONTROL DATA CORP	- 1/8	-.09	30.54
A	102	179- 95	151 3/4	*DIGITAL EQUIPMENT	+ 4 1/4	2.88	48.77
N	19 1/8	27- 18	19 3/4	ELECTRONIC ASSOC.	- 5/8	-3.07	3.27
N	87 1/4	108- 80	87	GENERAL ELECTRIC	- 1 1/4	-1.42	-.29
N	60	91- 59	77 7/8	HEWLETT-PACKARD CO	- 1 3/8	-1.74	29.79
N	93 1/8	139- 89	123 5/8	*HONEYWELL INC	- 2 3/8	-1.88	32.75
N	288 1/2	375-293	295 3/4	*IBM	- 4	-1.33	2.51
N	103 7/8	134- 99	189 3/4	*NCR	- 1/4	-.23	5.66
N	46 7/8	55- 41	41 3/4	RCA	- 3/4	-1.76	-10.93
N	39 1/8	107- 33	39 1/8	RAYTHEON CO	- 1 1/2	-3.69	.00
O	22 1/2	37- 31	33	*SCI. CONTROL CORP	+ 1/2	1.54	46.67
N	78 3/4	119- 79	110 3/4	*SCIENTIFIC DATA	- 1/4	-.23	40.63
N	45	61- 41	44 5/8	*SPERRY RAND	- 1 5/8	-3.37	3.61
A	22 1/2	39- 26	28	*SYSTEMS ENG. LABS	+ 1/2	1.82	24.44

SUPPLIES & ACCESSORIES

EXCH	BASE PRICE 3-1-68	1968 RANGE	CLOSING PRICE		WEEK NET CHANGE	WEEK % CHANGE	%CHANGE FROM BASE
O	48 1/2	62- 38	39	*ACME VISIBLE	---	----	-19.59
N	28 1/2	63- 17	18 1/8	ADAMS-MILLIS CORP	- 1/2	-2.68	-11.59
O	13 1/2	29- 12	23 1/2	*BALTIMORE BUS FORM	---	----	72.48
A	27	44- 21	22	*BARRY WRIGHT	- 2 3/8	-9.74	-18.52
O	31	44- 25	36 1/2	DATA DOCUMENTS	- 3	-7.59	16.88
N	27 1/4	42- 37	38 1/4	*ENNIS BUS. FORMS	+ 1/4	.66	40.37
N	58	93- 61	74 1/2	*MEMOREX	+ 2 3/4	3.83	28.45
N	84 1/8	119- 81	99 1/8	*3M COMPANY	+ 1 1/8	1.15	17.83
O	27 1/8	33- 25	30 1/2	*MOORE BUS FORMS	- 1/4	-.81	11.93
N	57 1/4	86- 36	38 5/8	NASHUA CORP	+ 1/2	1.31	-32.53
O	31 1/4	44- 38	40 1/2	REYNOLDS & REYNOLD	+ 2 1/2	6.58	29.60
O	34 1/2	35- 25	25	*STANDARD REGISTER	- 1/2	-1.96	-27.54
N	37 3/4	44- 28	29 1/4	*UARCO	+ 1/8	.43	-22.52
A	14 1/4	24- 13	14 7/8	WABASH MAGNETICS	- 1 3/8	-8.46	4.39
O	25 3/4	31- 30	30	*WALLACE BUS FORMS	---	----	16.50

LEASING COMPANIES

EXCH	BASE PRICE 3-1-68	1968 RANGE	CLOSING PRICE		WEEK NET CHANGE	WEEK % CHANGE	%CHANGE FROM BASE
O	18	43- 38	38 1/2	BOOTHE COMPUTER	- 1/2	-1.28	113.89
O	4	24- 4	13	COMPUTER EXCHANGE	---	----	225.88
A	25 1/8	36- 20	25 3/4	*COMPUTER LEASING	- 3/8	-1.44	2.49
O A	15 1/8A	15- 9	9 3/4	CONT COMPUTER	- 1 1/4	-11.36	-36.59
O	12 1/4	18- 9	10 1/4	*CYBER-TRONICS	+ 1/2	5.13	-16.33
A	106 5/8	184- 44	44 5/8	*DATA PROCESS FIN	- 1	-2.19	-58.15
O	25	14- 12	12 3/4	DATRONIC RENTAL	- 1	-7.27	-49.00
O	28	55- 44	46	DEARBORN COMPUTER	- 7/8	-1.87	130.00
O	13 1/4	12- 11	12 1/8	*DPA, INC	+ 1/4	2.11	-8.49
A	28 1/8	69- 32	33 1/4	GRANITE EQUIPMENT	- 1 1/8	-3.27	18.22
A	28 3/4	48- 21	21 3/8	*GREYHOUND COMPUTER	- 3/4	-3.39	-25.65
A	19 5/8	68- 15	37 7/8	*LEASCO DATA PROC	- 1 3/8	-3.50	96.25
O	5	14- 5	7 1/2	LECTRO COMP LEAS	+ 1/4	3.45	50.00
A	38 3/4	93- 39	48 7/8	*LEVIN-TOWNSEND SVS	+ 1/4	.62	32.93
O	10 3/4	18- 5	6 5/8	*LMC DATA, INC	+ 1/8	1.92	-36.98
O	10 3/8	72- 10	10 1/8	*MANAGEMENT ASSIST	---	----	-2.41
A	41 5/8	141- 25	33 7/8	NATIONAL EQUIPMENT	+ 1/2	1.50	-18.62
O A	13 5/8A	14- 8	10 1/2	NCC LEASING	- 1/8	-1.18	-20.75
A	38	64- 34	34 1/2	*RANDOLPH COMPUTER	- 1 1/2	-4.17	-9.21
O	5	32- 5	26	SYSTEM CAPITAL	- 1	-3.70	395.24
A	10 7/8	28- 9	25.7/8	U.S. LEASING	- 1/8	-.48	137.93

a—Since 10/18/68 *Companies included in Computerworld's stock trading index for each sector.

Earnings Reports

DATATAB INC.
Year Ended Dec. 31

	1967	a1968
Revenue	$967,914	$2,005,362
Earnings	80,028	186,366
Shr Ernd	.35	.67

a—Preliminary.

DIEBOLD COMPUTER LEASING
Year Ended Dec. 31

	b1967	a1968
Revenue		$12,813,000
Earnings		1,098,000
aShr Ernd		.28

a—Assumes conversion of debentures. b—Comparable figures not available because company started operations in October, 1967.

AM CORPORATION
6 Months Ended Jan. 31

	1968	a1969
Revenue	$175,339,000	$190,377,000
Earnings	7,117,000	8,247,000
Shr Ernd	.89	1.03

a—Subject to year-end audit adjustment.

APPLIED DATA RESEARCH
Year Ended Dec. 31

	1967	1968
Revenue	$2,870,380	$4,188,309
Earnings	234,245	528,515
Shr Ernd	a.28	.61

a—Adjusted for 50% stock dividend in March, 1968.

COMPUTER EXCHANGE, INC.
6 Months Ended Dec. 31

	1967	a1968
Revenue	$174,828	$950,555
Earnings	2,649	32,859
bShr Ernd	.01	.06

a—Unaudited. b—Based on average shares outstanding.

DIGITRONICS CORP.
9 Months to Dec. 31

	a1967	1968
Revenue	$10,158,546	$11,980,368
Earnings	292,870	748,267
Shr Ernd	.11	.25

a—Restated to reflect Dialight Corp. and Signal Indicator Corp. mergers on a pooling-of-interest basis.

COMMERCIAL ALLIANCE CORP.
6 Months Ended Jan. 31

	1968	1969
Revenue	$1,024,637	b$2,218,960
Earnings	334,265	547,347
Shr Ernd	a.48	.63

a—Included $.05 of extraordinary income. b—1969 financial and service charges include income on the sale of warrants on the common stock of a customer.

COMPUTER USAGE CO., INC.
3 Months Ended Dec. 31

	1967	1968
Revenue	$3,555,867	$3,360,847
Earnings(loss)	a199,724	(185,340)
Shr Ernd(loss)	a.28	(.22)

a—Includes extraordinary gain from sale of property less related expenses and applicable income taxes.

RIXON ELECTRONICS, INC.
9 Months Ended Jan. 29

	1968	1969
Revenue	$3,906,222	$3,860,722
Earnings	203,406	278,969
Shr Ernd	.32	.40

COMPUTING AND SOFTWARE, INC.
3 Months Ended Jan. 31

	a1968	1969
Revenue	$7,907,000	$8,783,000
Earnings	333,000	495,000
Shr Ernd	.24	.35

a—Restated to include acquisitions.

COMPUTER LEASING CO.
Year Ended Dec. 31

	1967	1968
Revenue	$21,109,000	$30,428,000
Earnings	1,625,000	3,276,000
Shr Ernd	.37	.66

a—Assumes conversion of capital notes, preferred stock, and debentures. b—Restated to reflect acquisitions made on a pooling-of-interest basis.

APPLIED DATA RESEARCH, INC.
Year Ended Dec. 31

	1967	1968
Revenue	$2,870,380	$4,188,309
Earnings	234,245	528,515
Shr Ernd	.28	.61

INFORMATION DISPLAYS, INC.
Year Ended Dec. 31

	1967	1968
Revenue	$1,132,644	$1,803,157
Earnings	51,551	89,519
Shr Ernd	.08	.14

DIGITRONICS CORP.
9 Months Ended Dec. 31

	a1967	b1968
Revenue	$10,158,546	$11,980,368
Earnings	292,870	748,267
Shr Ernd	.11	.25

a—Unaudited. b—Restated to reflect merger.

WALLACE BUSINESS FORMS
3 Months Ended Jan. 31

	1968	1969
Revenue	$6,178,600	$7,347,000
Earnings	323,600	406,000
Shr Ernd	.37	.46

6 Months Ended Jan. 31

Revenue	12,275,100	14,055,000
Earnings	684,400	807,000
Shr Ernd	.78	.91

HUDSON LEASING CORP.
6 Months Ended Dec. 31

	a1967	1968
Revenue	$3,682,081	$7,234,688
Earnings	213,893	600,477
bShr Ernd	.27	.60

a—Restated to reflect pooling-of-interest basis. b—Includes non-recurring gain of 9 cents per share.

MOHAWK DATA SERVICES
3 Months Ended Jan. 31

	a1968	1969
Revenue	$12,495,000	$19,940,000
bEarnings	800,000	1,375,000
bShr Ernd	c.15	.25

6 Months Ended Jan. 31

Revenue	22,580,000	35,730,000
bEarnings	1,165,000	2,515,000
bShr Ernd	c.22	.46

a—Includes operations of companies acquired during 1968, on a pooling-of-interest basis. b—Includes tax credits. c—Adjusted for a 100% stock dividend in July, 1968.

IBM's Williams Will Retire, Was on Top Executive Team

ARMONK, N.Y. – IBM announced in its proxy statement on March 14 that Albert L. Williams, one of four members of IBM's senior executive team, will retire effective March 31.

At the same time, Williams, who is 58, will become a consultant to the company on general management matters. He will continue as a member of IBM's board of directors and as chairman of the board's executive committee.

In making the announcement, Thomas J. Watson, Jr., IBM chairman, said, "Three years ago Mr. Williams, who was then president of IBM, asked to be relieved of his day-to-day management responsibilities because of a long-standing personal desire to retire at age 55.

A.L. Williams

At my request, however, he agreed not to go into full retirement; rather, to stay on as an active member of management by giving a portion of his time assisting me in the management of the corporation.

"Now, carrying out his plan, he is going into full retirement. Mr. Williams' great contribution to the success and growth of IBM is well known, and I am delighted that he has agreed to continue to serve IBM in a consultant's role."

Williams joined IBM in 1936 as a student salesman, was elected controller of the company in 1942, treasurer in 1947, vice-president and treasurer in 1948, executive vice-president in 1954, and president in 1961.

Time Share Adds Two

HANOVER, N.H. – Two data processing-oriented men have been elected to the board of directors of Time Share Corp.

Richard T. Bueschel, president, announced that the new directors are Prof. John G. Kemeny, Director of Dartmouth College Kiewitt Time-Sharing Center and a chairman of the Dartmouth College Mathematics Dept. for 13 years, and G. William Teare, Jr., President of Bru-El Graphic, Inc.

A former research assistant to Prof. Einstein at Princeton's Institute for Advanced Studies, Prof. Kemeny authored and co-authored 12 books devoted to data processing, mathematics, and the sciences. He is a Fellow of the American Academy of Sciences.

Computer President Joins Bank Board of Directors

TRENTON, N.J. – The Security National Bank of Trenton has elected Richard C. Jones, president of Applied Data Research, Inc., Princeton, N.J., a director, according to Frank Schuchardt, president of The Security National Bank of Trenton.

Jones, who was elected president of Applied Data Research in 1963, is also president of the Association of Independent Software Companies, the software industry's national association.

Applied Data Research, with executive offices and research center in Princeton, was founded in 1959, and is a national computer software and service company.

Davis Named Assistant Secretary of Commerce

WASHINGTON, D.C. – Kenneth N. Davis, Jr., a 42-year-old IBM executive, has been nominated by President Nixon to serve as Assistant Secretary of Commerce for Domestic and International Business.

The Massachusetts native attended Phillips Academy, earned his B.S. at MIT, an M.B.A. at Stanford, and studied executive management at Columbia. In 1949 he started as a data processing salesman for IBM in San Francisco, advancing within the corporate structure to become vice-president

TIME FOR SALE

HOUSTON

1108 TIME
thru downtown Houston Terminal
REASONABLE RATES
713/224-6129

CHICAGO AREA

360-40,128K
1410-7010 EMULATION
1401 COMPATIBILITY
ALL 360 COMPILERS
YOUR OPERATOR OR OURS
COMPUTYME OF CHICAGO
209 WEST JACKSON
CHICAGO, ILL. 312-922-6624

IBM 360/40, 65K, Five Model 3 Tapes, Two 2311 Disks, 1403 N1 Printer, 2540 Rdr./Pch., 2nd Shift 3rd Shift, and Weekends, Call Mr. Wieland at 312-236-4700.

PHILADELPHIA

360 – 30, 32K with two 2415 9-track tape, three 2311 Disk Drives and 1400 COS.
Short runs on very short notice, Large blocks of prime time available.
Ask for Mr. Soreth or Mr. Wood.
215-WA 7-7080

UPSTATE NEW YORK

Rockland County
IBM 360/30, 65K, Tape-Disk, DOS-OS, full compatibility. Call
W. E. Berry (914) 634-8877
Information Science, Inc.

MASSACHUSETTS

NEED TESTING TIME?
come to
IDC DATA CENTRAL
PRIME TIME
IBM 360/30

● 65K Bytes ● 3 Disks, 5 tapes ● 1401 compatibility ● Keypunches ● Programming & Systems personnel ● Operators ● Office & storage space ● Coffee room ● 24 hour operation, 7 days a week
Call Mr. Gorman at 944-2224 on weekends at 249-2296
INFORMATION DYNAMICS CORPORATION
80 Main Street
Reading, Mass. 01867

N.Y. AREA

IBM 360

32K, 4 Disks, 1403, 2540. A brand new system featuring COBOL, FORTRAN, ASSEMBLER RPG, PL/I complete 1401/1440/1460 compatibility. We have large blocks of time available on second and third shifts and we will offer big discounts for large quantity, long-term purchases. Economical, plenty of power: ideal for heavy print jobs or for the software house that can't afford a whole machine. We will tailor a resident pack to your requirements. Limited office space may be available at reasonable rents.

Call immediately
(212) 687-3406

Who Says People Don't Read Classified Ads?

360/40 COMPUTER TIME

- 131K, 2 channel
- Four 2311 disks
- Six 2401 dual density tapes (800/1600)
- Two 1100 LPM Printers
- All Shifts: $60-$120/hr.
- FULL SHIFTS also available at competitive prices.
- All peripherals
- Keypunching
- Programming
- Messengers
- Two 360/30's also
- Application packages.

SSI
Call: 212/687-2100
L. Krassner
STRATEGIC DATACENTERS, INC.
25 West 43rd Street—New York, N.Y. 10017
A Subsidiary of STRATEGIC SYSTEMS INC.
corporate offices: 605 Third Avenue, New York City 10016
FACILITIES ALSO IN WASHINGTON, D.C.

General-Purpose Computer Is First Goal of Company

ORANGE, Calif. – Tempo Computers, Inc. has been formed to produce a new line of data processing equipment and application solutions for commercial and industrial markets.

The first product, at their 340 W. Collins Ave. facility, will be a new integrated-circuit, general-purpose computer system with a 4096 word memory and a central processing unit.

The modular system can be expanded to 65,536 words and upgraded with input/output, larger memories (both in size and multiplicity), arithmetical control, and various peripherals. A complete softwear package will also be offered with the basic machine according to the company.

The president of Tempo Com-

J.E. McAteer

puters, Inc. is J. Edward McAteer who was formerly director of development at Varian Data Machines.

Space Technology to Be Applied to Peripherals

TORRANCE, Calif. – Time-Zero Corp., a space technology firm with assets over $1 million, has been formed through the purchase of the Marshall Laboratories subsidiary of Marshall Industries by a group of key management personnel and outside investors.

The major objectives of Time-Zero will be to maintain its expertise in space instrumentation business, and to utilize its advanced space technology and know-how to enter the industrial computer products business the company claims.

Presently, the company is concentrating on computer peripheral equipment such as controllers, power conversion systems for computers, military applications, magnetometers, nuclear instrumentation, and automatic checkout and data display equipment.

Delta Data Systems Forms New Caribbean Subsidiary

WASHINGTON, D.C. – Delta Data Systems has announced the formation of a new subsidiary, Caribe Delta.

The new organization will market proprietary computer software to the business community of Puerto Rico.

Among the systems listed as available for rapid installation in Puerto Rico are complete packages for accounts payable, general ledger, labor distribution, manufacturing payroll, contract cost control, and wholesale goods inventory control.

New Companies

Student, Money Matching Is Object of New Company

NEW YORK – Scholarship Search Corp., a new company, utilizes a computer system developed by Mandate Systems Inc. to match students backgrounds and interests to existing possibilities of financial aid. The object is to help students locate financial aid to further their education.

The service does not secure or offer financial aid, but gives the students a list of items, for which they qualify, thereby saving time and money for the student.

Manuel Hoffman has been appointed Director of Scholarship Search, a new subsidiary of Mandate.

Fast Food Backup Will Be First Featured by Wams

NASHVILLE, Tenn. – Whale, Inc. has announced the formation of Whale Automated Management Services, Inc. (Wams).

The new subsidiary will be located in its own facilities housing $3.5 million worth of computers.

Ronald Dickie, vice-president of the new organization, said Wams will provide on-line computer services to its customers, consulting and system services to firms maintaining their own computer facilities, and computer feasibility studies for firms considering installation or expansion of computer facilities.

At present, system design and programming is done on three IBM computers at Whale subsidiaries. Meanwhile, two IBM 360 Model 50 computing systems are being installed in the new Wams center. The first is expected to be operational in May and the second in August.

One of the first new systems to be designed and put into operation will be the installation of remote data entry terminals in a number of Fast Food outlets in March, 1969.

This equipment will permit daily transmission of each restaurant's operating data to Wams computer center which will process and analyze the results and file key management data electronically for recall as needed by executives.

Boothe Computer Forms Management Services Group

SAN FRANCISCO – Boothe Resources International, Inc. has been formed as a subsidiary of Boothe Computer Corp.

The new company, which will provide a diversity of computer oriented services, is headed by Ronald F. Morrison, president.

Morrison explained that the goal of the new company is to provide expertise to enable management to profitably use computers and data communications equipment in their operations.

The company will initially be organized in three main divisions. The Management Sciences Division will concentrate its efforts towards developing and integrating advanced management practices through the coupling of sophisticated computer technologies such as data communications networks.

The Systems Management Division will offer its clients complete professional counsel including the use of the latest computer hardware to establish criteria for equipment acquisition, pre and post installation planning, and customer facilities management.

The Marketing Services Division will offer professional personnel and worldwide facilities to serve as the marketing arm of small and medium size manufacturers of computer peripheral devices, input/output terminals, and components.

Hospital Record System Will Be Adaptable

CAMBRIDGE, Mass. – The formation of a new organization, Cambridge Medical Information Systems, Inc., is designed to expand the application of proprietary computer-centered information systems to the needs of the medical profession.

The company's objective is to offer a basic automated record traceability and control system made universally adaptable to the particular resources of any hospital. Cambridge Medical will provide all the necessary services to install, check out, and operate its information systems for hospitals.

Company Aims to Apply Optical Sensing Ability

CARROLLTON, Texas – The formation of a new manufacturing company, Optron, Inc., already staffed and in operation to develop, manufacturer, and market electronic products for the growing computer industry has been announced by David H. Monnich, president.

According to Monnich, Optron will couple the optical sensing capabilities of solid state devices of its own manufacture to product applications involving both

D.H. Monnich

light emitting and sensing requirements.

These applications include computer peripheral equipment, rotary transducers, and industrial controls.

Monnich is a U.S. Naval Academy graduate in electrical engineering.

Orders and Installations

The Picatinny Arsenal has installed an EAI 8900 hybrid computer in the Picatinny Engineering Sciences Lab, Feltman Research Laboratory at West Long Branch, N.J. Interior and exterior ballistics, and fuse simulation and analysis are some of the applications of the new computer. Stress analysis, two- and three-dimensional temperature gradients, and evaluation of manufacturer's proposed services are being developed.

Statistical Tabulating Corp., Chicago, Ill., has installed two Control Data 915 page reader systems in the company's Chicago and St. Louis offices. The systems are being offered to customers as an advanced and economical method of compiling data directly from the source.

Helena Rubinstein Inc., Greenvale, N.Y., cosmetics manufacturer, has ordered a Univac 9400 computer system to be installed at the firm's accounting office in East Hills, Long Island. Initially it will be used for billing and sales statistics.

The Northeastern Electricity Board, London, England, has ordered an ICL System 4-70 computer to be used in the preparation of approximately five million electricity accounts. The computer will also be used for accounting work, calculations required in the planning and designing of new electrical networks, and to store engineering and other electricity supply information.

The Financial Computer Center of Eastern New York, Inc., has installed a second GE-415 computer in its new facility to process 300,000 items daily for its 12 member banks in nine area cities. The two systems will operate on a three shift basis, five days a week, processing savings accounts, checking accounts, installment loan accounts, Christmas and vacation club accounting, full account reconciliation and dividend accounting.

The Physics Division of the Chalk River, Ontario, Nuclear Laboratories has installed a PDP-10 computer for on-line acquisitions and manipulation of data from a Model MP Tandem Van de Graaf accelerator. The PDP-10 will be interfaced with a PDP-1.

Lockheed-California Co., a division of Lockheed Aircraft Corp., Burbank, Calif., has ordered a high-speed data acquisition system from Astrodata, Inc. The system will be used to acquire, record, and reduce test data at the company's Rye Canyon facility.

The First National Bank, DeKalb, Ill., has ordered a B340 electronic computer system to handle proof transit, demand deposit accounting, and savings and installment loans.

Com-Share, Inc., has ordered a Scientific Data Services Sigma 7 time-sharing computer system for installation at its Ann Arbor, Mich., headquarters. The system will be used to provide a remote batch processing service.

Frost, Johnson, Read and Smith, a Charleston, S.C., investment firm, has installed an NCR Century 100 system to keep track of "buys" and "sells" and to handle position records and customer billing.

Randolph Data Services, Inc., Cincinnati, Ohio, has ordered an IBM 360/40 computer to replace an IBM 360/30 system.

The New Jersey State Dept. of Health has ordered an RCA Spectra 70/45F computer system for delivery in April. The system will replace an IBM 1440 system currently in use. In addition to processing normal applications, the unit will be on-line to a statewide air pollution monitoring system.

The Computer System Division of Graphic Controls Corp. has installed a PDP-10 system and ordered a second PDP-10 system for delivery later this year. The company provides interactive and batch processing services for engineering, business, and education applications.

The Chalk River Nuclear Laboratories of Atomic Energy of Canada have installed a Control Data 6600 computer at its facility in Ottawa for use in research and development programs. The system consists of a central processor and 10 smaller peripheral processors which operate input and output equipment. Control Data 6000 series computers are currently in use in the facility.

The First Federal Savings, Detroit, Mich., has contracted with Sperry Rand Corp. for the purchase of a $1.6-million Univac 494 real-time computer system to handle all customer transactions and provide on-line service for other savings and loan associations in the Detroit area. Special teller window transaction machines at branch banks will be tied-in with the central computer by means of direct phone lines.

Midland and International Banks Ltd., London, has ordered an ICL 1901A computer. MAIBL is active in the taking of sterling and Euro-currency deposits as well as in the granting of medium-term sterling and Euro-currency loans to countries throughout the world. The new system will be used in all facets of the bank's operations.

The Texas Bank and Trust Co., Dallas, has installed a Manage computer system to eliminate cards for programs operating on the bank's IBM 360 computer. The new system provides for the systematic maintenance of files of programs for standard computer languages and documents any changes in programs made during the life of the program.

The Department of Defense has installed a Control Data 915 page reader at the Defense Supply Agency, Ogden, Utah, to be used in inventory control, stock requisitioning, and issue supplies. The systems uses a scanning device that reads source data from typewritten documents, edits and formats, and transmits it to magnetic tape, bypassing punched card operation.

EDPeople on the move

	Is Now	At	Was	At
Jack S. Fisher	Systems Director Technical Documentation	Delta Data Systems College Park, Md.	Director Proposal Effort	C-E-I-R, Inc.
Harry Castellucci	Regional Manager Applications Software	Scan-Data Corp. West Beverly Hills, Calif.	Regional Manager Applications Analysts	Farrington Mfg. Co.
Jack L. Marcus	Assistant Manager Data Center Div.	Computer Management Consultants, Inc.	Credit Card Billing	Ehlers Maremont & Co.
Andrew E. Van Esso	Corporate Manager Data Processing	Chemetron Corp. Chicago, Ill.	Supervisor	Peat, Marwick, Mitchell & Co.
Robert E. Courtney	Director Public Systems	Computer Conversions, Inc. Jenkintown, Pa.	Director ADP Development	State of New Jersey
David M. Leuschner	District Sales Mgr. Graphic Systems Div.	Computer Industries, Inc. Van Nuys, Calif.	Electronic Sales	Gulton Industries
Ralph T. Williams	Manager Information Systems	H.K. Ferguson Co. Cleveland, Ohio	DP Manager	API Instruments Cleveland, Ohio
Frederick C. Lohrum	President Cincinnati Division	Randolph Data Services Cincinnati, Ohio	Marketing	IBM Corp.
Stanley T. Hatch	Marketing Director	Information Systems Management Corp. Richland, Washington	Marketing Representative	IBM

J.L. Marcus

A.E. Van Esso

Acquisitions

MENLO PARK, Calif. – An agreement in principle on terms by which **Atlantic Microfilm Corp.**, Spring Valley, N.Y., will be merged into **Arcata National Corp.** has been announced jointly by both companies. Under the terms of the proposed merger, each common share of Atlantic Microfilm will be exchanged for 0.4 common shares of Arcata National. The terms are subject to the negotiation of a definitive contract, approval by the boards of directors of both companies, and the favorable vote of Atlantic shareholders.

CHICAGO – **Greyhound Computer Corp.** and Brooke Bond Liebeg, Ltd. have announced the signing of an agreement for the sale by Brooke Bond of the entire stock capital of **Management Dynamics Ltd.** and its subsidiary companies to Greyhound Computer. The agreement is subject to final approval of various governmental agencies in the United Kingdom and the United States

CUCAMONGA, Calif. – **Data Design Laboratories** has completed the acquisition of **Circuit Design & Mfg., Inc.**, LaVerne, Calif., for an undisclosed amount of stock. The newly-acquired company will operate as a wholly-owned subsidiary under the supervision of former owners James R. Savage and Huey P. Savage who have become, respectively, president and vice-president.

MIAMI – **Computer Controls Corp.**, a computer time-sharing corporation, announced the acquisition of **Computer Languages Corp.**, a computer programming and systems training school at Jacksonville. The acquisition was made for the sum of $35,000 cash. John Q. Dent and Richard A. Calhoun will continue as the chief operating officers of the language company.

DALLAS – **University Computing Co.** has reported an agreement in principle with **Automation Center International** of Zurich, Switzerland, to combine operations of the two companies.

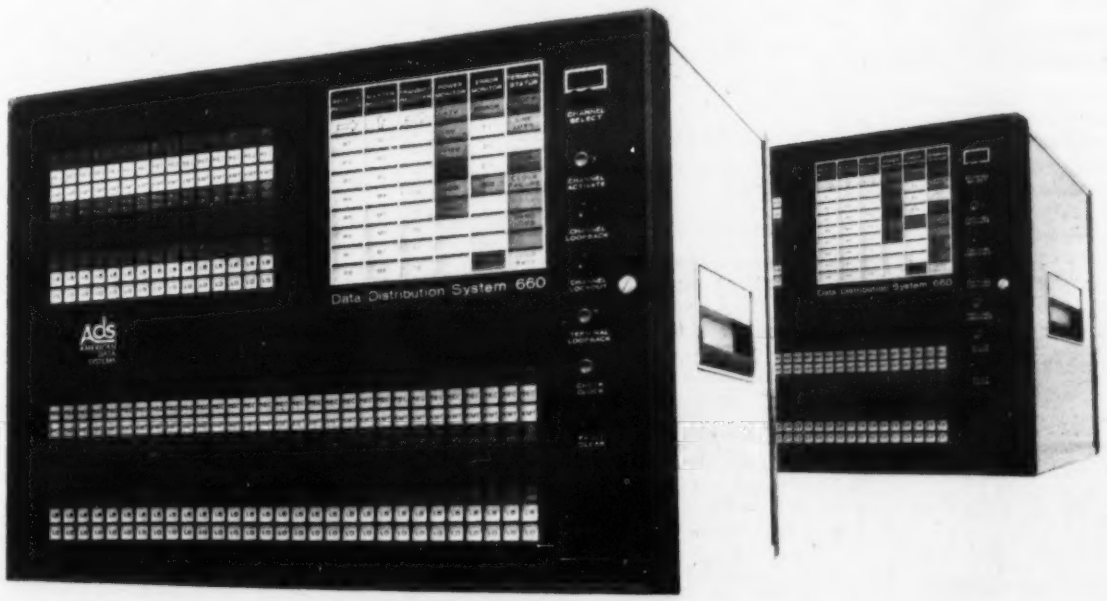
MINIMIZE

TIME-SHARING COMPUTER

DATA COMMUNICATIONS COSTS

Now, a data concentrator that can simultaneously multiplex up to 45 remote computer terminals over 1 telephone line...

THE AMERICAN DATA SYSTEMS
660 DATA DISTRIBUTION SYSTEM



The first in a series of new generation data communication products by American Data Systems, the ADS-660 incorporates multiplexing techniques to achieve the ultimate in data concentration.

Featuring...

Ability to intermix up to three baud rates simultaneously ● Capable of multi-drop configurations with economics normally associated with frequency division multiplexing ● Improved efficiency allows maximum number of remote computer terminals ● Complete dignostics built in, functional visual display of communication network status, error monitor and alarm ● Manual selection of individual channels and terminal for loop back or lock out control ● Operates with any synchronous high speed data modem (2000 to 9600 bits/second) ● Modular design allows for easy channel expansion-start with a few, increase to forty-five ● The standard ADS-660 can be used interchangeably for at computer or remote sites ● Competitively priced with immediate availability.

Write, call or visit for further details!

Ads AMERICAN DATA SYSTEMS

20747 Dearborn St., Chatsworth, California 91311
Phone 213 - 882-0020

POSITION ANNOUNCEMENTS

EDUCATION SPECIALIST

Our client, a very large insurance and mutual fund group working through independent agents and with assets over three billion dollars, is planning to develop a communications network to integrate fifty-five branch offices and over ninety sales offices. Current expenditures are in excess of $6,000,000 annually for EDP equipment and communications services. Forecasts indicate that this will amount to $12,000,000 annually by 1975.

The Education Specialist, working closely with the Manager, Training Information Processing Systems, will participate in the planning, development, and administration of an Education Program for company personnel in support of the new division's objectives. He will be responsible for curriculum development and administration of the staff of instructors. Plans include a Career Path program for professional data processing personnel through formal and on-the-job training courses and management and user orientation and training.

This is a new position. Starting salary to $16,000.

The ideal candidate will have:

- a minimum of four years' experience with large-scale systems in the data processing industry, including two at the management level; at least four years' experience in performing the functions, tasks, and activities that he is to coordinate and supervise;
- a record that demonstrates his ability to develop and administer education programs requiring the planning of curriculum for in-house or customer personnel, the use of modern education techniques and equipment, and the supervision of instructors;
- a degree in a business-related or education-oriented field.

Call, write, or send a resume in confidence with salary history. Interviews can be arranged in leading metropolitan areas. Client pays fee.

WCP / INFORMATION SYSTEMS PERSONNEL: RECRUITING AND CONSULTING

AN AGENCY AFFILIATE OF WESTERN OPERATIONS INC.
120 MONTGOMERY ST. • SAN FRANCISCO, CALIF. 94104 • (415) 981-1131

An Equal Opportunity Employer

SENIOR SYSTEMS ANALYST

Our client, a very large insurance and mutual fund group working through independent agents and with assets over three billion dollars, is planning to develop a communications network to integrate fifty-five branch offices and over ninety sales offices. Current expenditures are in excess of $6,000,000 annually for EDP equipment and communications services. Forecasts indicate that this will amount to $12,000,000 annually by 1975.

The Senior Systems Analyst will work with management to prepare plans and proposals describing new and major modifications to be made in existing large-scale systems. He may work with a team of analysts or programmers or serve as a project leader to develop methods to maintain or modify present systems and to develop new systems. Candidates should have 3-5 years' experience in a medium or large-scale systems environment. Programming experience preferred.

This is a new position. Starting salary to $16,000.

Call, write, or send resume in confidence with salary history. Interviews can be arranged in leading metropolitan areas. Client pays fee.

WCP / INFORMATION SYSTEMS PERSONNEL: RECRUITING AND CONSULTING

AN AGENCY AFFILIATE OF WESTERN OPERATIONS INC.
120 MONTGOMERY ST. • SAN FRANCISCO, CALIF. 94104 • (415) 981-1131

An Equal Opportunity Employer

BUY SELL SWAP

COMPUTER SERVICES FOR AGRIBUSINESS
1● Custom Programming
1● Systems Analysis & Design
1● Data Processing
1● Software Franchises
1● Management Information Systems
1● Consulting
AgData Inc.
P.O. Box 1077, Davis, Calif. 95616
Area Code 916/756-1050

BUY–SELL–LEASE
Unit Record Equipment
Disc Packs
Computer Leasing
Michiana Leasing Corp.
1814 South Main St.
South Bend, Ind. 46613
(219) 288-1431

IBM
7094/1410
SYSTEM
Available immediately at Attractive purchase or lease terms.
I.O.A. DATA CORP.
383 Lafayette St., NYC
(212) 673-9300 ext. 50

AVAILABLE APRIL 1st

1411 MODEL 3 CPU, 40K 2 CHANNELS with TAPE ADAPTER, PRIORITY FEATURE, PROCESS OVERLAY and HIGH, LOW and EQUAL COMPARE FEATURE.

AND

1415 MODEL 1 CONSOLE with TAPE DENSITY OPTION SWITCH.

Both under MANUFACTURERS MAINTENANCE SERVICE AGREEMENT.

Contact: Mr. John Cummings
Lone Star Gas Company
301 South Harwood
Dallas, Texas 75201
(214) RI 1-3711 Ext. 2180

Programmers
Alaska
Minimum 1 year programming experience. Challenging assignments in development of Management Information System for the State of Alaska.
Programming in COBOL on IBM S/360-40 Tape and Disk configuration. Send brief resume to:
R.S. Waller
Systems & Programming Supervisor
Division of Data Processing
Pouch "C" Alaska Office Building
Juneau, Alaska 99801

IBM KEYPUNCHES
IMMEDIATE DELIVERY
At our plant we remanufacture all types of unit record equipment.
Universal Processing Corp.
228 Highland Parkway
Roselle, N.J. 07203
(201) 241-7422

IBM
- Second Generation Leases
- 20-60% Off IBM Rental
- 12-36 Month Leases
- 1401's, 1440's, 1460's, 7070's, 7074's.

SUMMIT COMPUTER CORPORATION
785 Springfield Avenue
Summit, New Jersey 07901
(201) 273-6900

TELETYPES — COUPLERS
Fixed — Mobile — Portable
(Buy — Lease — Rent)
Supplies
Paper — Tape — Ribbons
COMPUTER SOLUTIONS INC.,
50 Washington Terr.
East Orange, N.J.
(201) 678-6300 – (212) 349-1531

FOR SALE OR LEASE:
NCR 500 system including line printer. For additional information, contact
Mitchell-Supreme Fuel Co.
532 Freeman St.
Orange, N.J. 07050
201-678-1800

IBM Computer Systems and Punched Card Equipment Bought and Sold.
International Computer Equipment, Inc.
I-C-E, Inc.
1231 25th St. N.W.
Washington, D.C.
202-293-3910
See Ad On Page 5

EFFECTIVE IMMEDIATELY
AD SIZE 2 inches OR $36.40

Computer Products Manufacturers Rep. seeks lines for Eastern U.S. Software, Hardware, Leasing, etc. Send descriptive material, territory and commission arrangements to Box 3042 Computerworld.

SELL YOUR
Used Equipment
Keypunching Services
Leasing Services
Consulting Services
BUY SELL SWAP

CDC 160-A WANTED
WILL PAY CASH FOR SYSTEM IN GOOD CONDITION.
U.S. SYSTEMS & SOFTWARE, INC.
2125 SOUTH MANCHESTER AVE
ANAHEIM, CALIFORNIA 92802
(714) 633-9231

COMPUTER ACQUISITIONS CO.
WE BUY ■ WE BUY
WANTS
■ *COMPUTERS, ALL MAKES*
■ *UNIT RECORD EQUIPMENT*
(404) 636-8090 • BOX 29185
ATLANTA, GA. 30329
WE BUY ■ WE BUY

For Sale
B5500 System

Central Processor
2 I/O Channels
8 Memory Mods (32K)
6 Mag Tape Units (66KC)
1 Card Reader (800 CPM)
1 Line Printer (700 LPM)
1 Card Punch (300 CPM)
3 Disk Mods (10MS)

Contact
Mr.G.Ahmuty
Allis & George
Wendy Lane
Westport, Conn.
(203) 227-8534

Will Sell All Or Part Of The System

ACM & Its Dollars - Part 1

What Happened To the Safeguards?

By Alan Taylor

The Association for Computing Machinery, like any other society, has an intricate structure of bylaws, a constitution, and committees. A major purpose of this structure is to ensure the financial stability of the society. Most societies find it works – but not ACM. Financial disaster struck the ACM suddenly at the end of 1968. At the ACM Council meeting Dec. 12, no sign of imminent disaster was apparent. The financial reports took up less than five minutes of discussion, then the council adjourned for five months. The very next month, January, 1969, the ACM was unable to pay its bills.

This is exactly the type of situation which the society structure is supposed to avoid. The structure has worked satisfactorily for other societies. Why did it fail for the ACM?

There are four major safeguard levels in ACM: laws restricting the powers of the council, bylaws ensuring independent auditing, a standing committee to check financial affairs, and obligatory publication of budgets and accounts so that the members can know what is going on.

The theory is that basic laws may or may not be obeyed – but that if they are not, then the committee, or the independent auditors, or the membership itself will realize what is going on, and will announce it to the world. The system is supposed to be self-policing.

There are actually only two basic rules involved. One says that the council shall adopt a budget – and the other that the council has no power to spend more than $25,000 of unbudgeted money unless it either has membership approval or the expenditure involves a jump of less than $25,000 over the previous year's cost of a particular item. For example, if $100,000 were spent last year and no funds were budgeted this year, the council could spend up to $125,000.

The ACM financial year starts July 1, so the 1968-69 year runs from July 1968 to June 1969. The budget is generally adopted before the start of the year, and the audited accounts are published about eight months afterwards. The most recent year in which the complete cycle can now be seen is fiscal 1967-68. In that year, ACM official figures indicate that the $25,000 rule was broken – and broken more than once. For instance, the budget for professional development was overextended – not by $25,000, not by $50,000, not by $75,000 – but by $94,971! True, the professional development budget was pretty large – $166,000 – to begin with. The total overspending was only some 55% of the original budget. However, the insurance, legal, and professional budget was overspent by more than $25,000 – on a budget of $5000! It went to $31,288 – a 500% overexpenditure.

And yet these overexpenditures were not detected, or, if they were, no action was taken to recover the unauthorized expenditures from the council members or from the bonding company. Nor were any measures taken to prevent a recurrance. What happened to the financial safeguards?

Computerworld has tried to find out by looking at how the various safeguards worked both before and during fiscal 1967-68.

Treasurer, Finance Committee Silent

First of all, the treasurer apparently did not notice the overexpenditure. At any rate, he made no mention of it in the council meetings when presenting the 1967-68 expenditures.

Equally, the finance committee made no issue of the matter during any of the council meetings.

Budget Not Audited

The independent auditor who examined the ACM's books apparently did not examine the constitution, bylaws, and budget. His report, addressed to the executive committee (instead of to the ACM member who is supposed to employ him under the bylaws), makes no mention of any budget item. Nor was the audit handled in the same form as the budget, so comparison is difficult. The audit does, however, break up the insurance, legal, and professional item into three items, instead of the single item adopted in the budget. This device makes it harder to see the discrepancy between the budget and the accounts, giving a surface appearance of legality.

Members Confused

The membership was not given the information necessary to enable them to check the data. Although the constitution calls for the publication of the budget "without undue delay," the 1967-68 budget was never published. A "summary" of it was published in July, 1966, but this so amalgamated items that the use of this publication as a safeguard was lost. In any case, the members could not have known until too late, because they did not see the 1967-68 financial figures until March, 1969 – long after the time was past for any remedial action.

That was how the four financial safeguards worked in 1967-68. The overexpenditures were ignored by the treasurer, the financial committee, and the auditor, while being disguised to the members.

Changes to Financial Safeguards

Since then, however, these financial safeguards have been changed. Not, as one might expect, to strengthen them –

but instead to demolish or weaken them! The safeguard that the auditor should be independent of the council was unceremoniously, and without notice to the membership, removed by the council in its December, 1968, meeting. It probably was not very important – because in the past it apparently was observed only as a matter of form. Clearly the intention of the framers of the constitution was that different auditors be employed each year. However, Jerome Ettinger, CPA, appears to have been chosen consistently for some years. (He also appears to have been underpaid. His fee was only $2832 for handling the 1967-68 turnover of *$1.4 million*).

$25,000 Limit Being Deleted

The $25,000 limit on unauthorized expenditures is still nominally in force, although the treasurer's report of February, 1969, happily contemplates one unbudgeted item of $100,000 being permitted without challenge! This safeguard happens to be in the constitution, so it is difficult to dislodge. But efforts are being made to have it removed.

This move to delete it came Sept. 9, after *Computerworld* reported that the rule was being broken and gave examples [CW, Sept. 4]. President Bernard C. Galler asked the Constitution and Bylaws Committee to recommend its removal. The committee took no time in agreeing with him and, Sept. 18, did recommend its removal. The membership, of course, did not know of this action. The committee gave no reason for the recommendation. At the next council meeting, in December, the next step was taken. The recommendation was ordered sent to the membership – a necessary requirement.

Reduced Publication Data

The power of the membership to check on the officials also is being quietly eliminated. The members' ability to check requires that they have access to the budget and the actual expenditures, and that they are able to compare them. The use of a "sumary" budget and a list of expenditures which does not refer to the budget amounts makes comparison all but impossible. This is what occurred in 1967-68.

No 1968-69 Budget

But the almost impossible 1967-68 situation has been improved upon. The situation in 1968-69 is such that it is *quite* impossible for the members to check on the expenditures. They cannot compare the actual expenditures with the approved budget – *because there is no approved budget!*

Neither the old or new ACM councils ever adopted a 1968-69 budget. In a last-minute meeting in May, the old council adopted a $1.9-million ceiling on expenditures and authorized the ACM Executive Committee to "fine tune" the budget. Whatever that means – it certainly is not adopting a budget. Nor is publishing this resolution of the council the same as publishing a budget. So now the membership no longer is in a position to act as a financial safeguard.

Cause of Financial Crash

The story of the financial safeguards is not a happy one. The ACM financial crisis came after the financial safeguards were diluted and disused. One can surmise, but not prove, that there is a cause-and-effect connection here, and that if the rules had been obeyed strictly, the ACM would not now be in financial crisis.

Next week, what happened while the ACM was going broke.

DILUTION OF FINANCIAL SAFEGUARDS WHILE ACM LOSES FINANCIAL CONTROL

FINANCIAL SAFEGUARDS	Prior to 1967	1967-68	1968-69	1969-70
$25,000 Limitation on Unbudgeted Expenditures	■ Apparently Obeyed	▬ In Force, But Ignored	▬ In Force, But Ignored and in Process of Being Deleted	? ?
Audit Independent From Council	▬ Same Auditor Each Year	▬ Auditor Reports to Council	□ Independence Requirement Abolished Dec. 1968	
Budget Publication	■ Fully Published	▬ "Summary Published"	▬ "Ceiling Published"	? ?

COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY
SIXTY AUSTIN STREET, NEWTON, MASSACHUSETTS • 02160 • TELEPHONE: (617) 332-5606

is the only Data Processing Media that lets you make 4 advertising sales calls a month on your prospective customers. The other guys only let you make 1. Next month . . . make 4 calls . . . not just 1 . . . and at the lowest cost per thousand too. Closing date every Friday for the issue mailed the next Wednesday.

Contact your nearest COMPUTERWORLD sales office or

Advertising Department
COMPUTERWORLD
60 Austin Street
Newton, Mass. 02160
(617) 332-5606

Setting Up Shop

A Control Data 3800 is unpacked under the watchful eye of Tod Morcott, president of Interaccess Corp., Palo Alto, Calif. The 3800, together with Varian 620/i and Control Data 1700 satellites, will enable the firm to offer each time-sharing client nearly 100,000 48-bit words of virtual core storage. The service will be offered nationally.

NBS Is Asked to Produce A Reference Disk Pack

MINNEAPOLIS, Minn. -- The National Bureau of Standards has been asked to produce a standard reference disk pack to help manufacturers make compatible disk packs. The request came from the USA Standards Institute Task Group, which has been exploring ways of specifying magnetic processes so that a standard for interchangeable, six-disk packs could be implemented.

The USASI group asks that the NBS accept the IBM 1316 Master Reference Standard as an amplitude reference and develop the procedures for producing a reference disk to serve as the official measurement reference.

The group also requested that the NBS include in its reference program measurements and specifications consistent with the IBM 2311 operational and test conditions, and with test heads which are calibrated and loaded in accordance with the IBM 2316 test head requirements.

Recently the NBS made available a reference tape for use in the manufacture of computer tapes. The action set a standard without involving the NBS in the acceptance of specific manufacturing standards. The 600-foot, specially recorded tape was made available for use with densities up to and including the 1600-bit/inch current standard.

what would you do if you just discovered that your present data processor or computer wasn't getting the job done...

who would you call?

DATAB

Data Tab Equipment Sales Corp., Inc.
1115 Security Drive Dallas, Texas (214) 638-5081

We are the people who buy and sell data processors, computers and accessories of all kinds, new and used, just so that people like you can have the right equipment at all times for your rapidly changing computer requirements . . . and we are very competitive!

Turn the Peopleware problem into an opportunity ...with a

COMPUTER ENVIRONMENTS CENTER Franchise

A CEC Franchise is unique. It's an "open-ended" agreement that makes it possible to market other needed computer-related services in addition to computer career training. Better yet, the franchise offer comes from a firm with a thoroughly proven record of success and an unimpeachable reputation for professionalism and knowhow . . . not only in computer education but in all areas of electronic data processing (time-sharing services, software, applications, management seminars, , others). Best of all, CEC provides continuing assistance in successful school-operating methods . . . and the industry's best, most dynamic curriculum. Write today for details on how you can turn the computer education problem into an opportunity.

Frederick B. Bartlet
Director of Franchising

CEC COMPUTER ENVIRONMENTS CORPORATION
Hanover, N.H. 03755
Tel. (603) 643-4655

a TIME SHARE company

COMPUTERWORLD
Advertising Sales Offices:

New York City:
Don Fagan
Grant Webb & Company
509 Madison Ave.
New York, N.Y. 10022
(212)688-7550

Midwest:
Dennis Collins
Grant Webb & Company
333 N. Michigan Ave.
Chicago, Ill. 60601
(312)236-5817

San Francisco Area:
Bill Healey
Jules E. Thompson Co.
1111 Hearst Bldg.
San Francisco, Calif. 94103
(415)362-8547

New England:
R. Ziegel
COMPUTERWORLD
60 Austin St.
Newton, Mass. 02160
(617)332-5606

Los Angeles Area:
Bob Byrne
Sherwood/Byrne Assoc.
1017 N. La Cienaga Blvd.
Los Angeles, Calif. 90069
(213)657-6221

Elsewhere:
Neal Wilder
National Sales Manager
COMPUTERWORLD
60 Austin St.
Newton, Mass. 02160
(617)332-5606